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FOREWORD

As seen against global trends, the population of Europe is characterized by very low rates of growth and a high level of urbanization. However, various patterns of the demographic transition, as well as of the mobility transition can be identified in individual European countries. These variations are reflected in the values of such basic indicators as birth rates, the age composition, and internal migration rates.

Central Europe exhibits a mosaic of different patterns of spatial population change of which Austria and Poland represent specific examples. While being close to the point of zero population growth, Austria faces a sizeable immigration of foreign population. Poland, on the other hand, shows considerable fluctuations in the rates of population growth over the recent decades; it also has a strongly negative balance of foreign migrations. Despite those differences that appear at the national level, the regional population trends in Austria and Poland display some similar features. This applies, for example, to inter-regional variations in the pattern of population ageing, or to rural depopulation trends. An important point of common interest is

the changing position of the two capital regions (i.e. Vienna and Warsaw) in the respective population systems, and their role as major foci for international contacts.

The present volume contains revised versions of selected papers presented at the seminar on: Spatial population change in Austria and Poland, held in Warsaw and Nieborów between 26 and 29 October, 1989. The seminar brought together some twenty geographers and demographers from the two countries. In addition to the opportunity to present and discuss the results so far obtained, the meetings offered a framework for the establishment of some joint comparative research on regional and urban population trends in Austria and Poland.

The Editors

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REGIONAL POPULATION DEVELOPMENT AND THE SERVICE SECTOR IN AUSTRIA

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1. INTRODUCTION

Since Robert Malthus has stated his law on population increase in relationship to restricted natural resources, a considerable amount of scientific research has concentrated on the interdependences of economic and population development. The well-known book of Meadows on "The limits of growth" (1973), for example, draws quite pessimistic prospects for worldwide development over the next century. Recent literature (e.g. Hauser 1989) tries to include ecological aspects, especially the impact of morbidity and epidemics, in drawing the possible future demographic developments of mankind. One of the most relevant concepts in looking at the interdependences of economic and demographic structure is the well-known model of demographic transition which has been studied intensively with regard to the industrialized world. The model was expressed first in Notestein's theory (1945) which is closely connected to Mackenroth's more historically oriented theory (1953). According to the concept, economic growth is a product of industrialization and leads to the emergence of the welfare state. Individuals and families are able to change their family-planning behaviour due to the economic growth process: birth- and death rates decrease first and stabilize at a low level later on.

Demographic data show that the demographic transition has occurred in Austria too. A hundred years ago, birth- and death- rates in Austria were at a very high level (1870: 34.5 birth rate, 31.0 death rate; 1900: 30.3 birth rate, 21.9 death rate[1]). The rates decreased rapidly in the 1920s and 1930s of the current century (1930: 16.8 birth rate; 13.5 death rate). In the last period both rates declined considerably once more (1987: 11.4 birth rate, 11.2 death rate). Still, there is a small surplus of births over deaths. Nevertheless, although the tendency of decrease has slowed down in the case of birth rates, the decline will most probably continue.

Meanwhile, a new mode of industrialization is observed in the already industrialized countries. It is the result of the new global division of labour which supports central regions controlling the allocation of capital over the entire world. Headquarters of big corporations located in "world-cities" are characteristic of this development. Modern manufacturing depends on many service functions leading to the rapid increase of production-oriented services whilst the labour force in the productive sector itself stagnates or decreases. These processes are often labelled as "post-industrialization" or "tertiarization". In addition to this development, and in accordance with economic growth, private households in the industrialized countries are able to spend more and more money on consumer goods and

[1] Live births per 1000 resident inhabitants; deaths per 1000 resident inhabitants.

services. The increase in international tourism is an indicator for this development. All these processes influence the social structures and the spatial organization of societies (Crang 1990). Owing to the low rates of natural population increase in industrialized countries like Austria, reactions to these recent economic restructuring processes will mainly apply to migration and commuting patterns.

In this paper, the spatial processes of tertiarization in Austria are traced and linked to the spatial structure of population development. Due to the lack of recent regional statistics some of the results presented in the following should be treated with reserve. The last detailed Census data available are 1981 data. Results of the 1991 Census will be published in a couple of years only. Thus, this paper has to be regarded as a retrospective study of regional economic and demographic development between 1971 and 1981.

2. THE PROCESS OF TERTIARIZATION IN AUSTRIA

2.1. THE TRADITIONAL THREE SECTOR THEORY AND RECENT SOCIOECONOMIC DEVELOPMENT

A.G. Fisher (1935), C. Clark (1940) and J. Fourastié (1949) are cited in the literature as the founders of the Three Sector Theory, which explains the importance of the service sector for modern economic growth and social welfare. Fisher argues that increasing consumption is strongly related to the development of service activities and its positive impact on labour markets. Clark and, especially, Fourastié use arguments of productivity to classify economic activities. Fourastie estimates the share of the service sector to reach about 90% of the total employment at the end of the long process of economic change. Looking at the high share the service sector has reached in most of the industrialized countries by now, and considering the fact that the process of increase is still going on, Fourastie's projections seem to be quite sensible (see Illeris 1989).

Recent scientific literature criticizes the sector theory as outdated and inadequate to explain the modern processes of socio-economic change. At least two points of the critiques have to be considered: (A) The tertiarization of the modern industrialized economies cannot be explained in terms of the national economy only. The forces of the tertiarization process are internationally based and influence the national economies as part of the global economic system. We have already mentioned this problem. (B) The rapid growth of "producer services" such as finance, insurance, legal services, transportation and communication, accounting, advertising and marketing, also research and development, etc., leads to a dualistic development. Producer services are provided by specific producer-service firms, as well as by manufacturing enterprises. Thus, one has to distinguish between external and internal producer services (Hansen 1990, p. 465). The general statistics show the external producer services as economic units of the tertiary sector only, whereas other producer services are included in the secondary sector. In analysing the "tertiarization" of the manufacturing sector (Clement 1988), the available statistical data, therefore, are inadequate. In this paper, official statistical data which group economic units in three main (primary, secondary and tertiary) sectors, according to the main output of the enterprise are used.

2.2. THE DEVELOPMENT OF THE TERTIARY SECTOR IN AUSTRIA

Looking at employment figures by the three main economic sectors (i.e. enterprises or economically active units classified according to the dominating output), a rather clear process of tertiarization is observable for Austria within the last decades (see Table 1).

TABLE 1. Employment in the main sectors of the economy (in per cent)

Year		Primary	Secondary	Tertiary	Unknown
VZ	1961	22.78	46.52	29.57	1.13
VZ	1971	13.77	41.88	42.39	1.96
MZ	1981	10.13	40.28	49.41	0.18
MZ	1987	8.36	37.94	52.63	1.07
MZ	1989	7.77	37.08	54.20	0.95

VZ – Census (*Volkszählung*), MZ – Microcensus (*Mikrozensus*).

The share of the service sector in Austria almost doubled between 1961 and 1987. In 1987, the primary sector made up 8 per cent only, the industrial (secondary) sector[2] a little more than one third. More than half of the employees were in the tertiary sector. This development is similar to the dynamics in other industrialized countries. Following the international comparison worked out by Fontaine (1987 cit. after Illeris 1989) the share of the service sector in Austria was relatively low in 1960 in comparison to other countries, e.g. to France with 43%, the United Kingdom with 49%, the Netherlands with 51%, and the USA with 58%. Currently (1985), the share of the service sector in the most highly industrialized countries is about 58–69%. As a first result one can state that the tertiary sector in Austria is growing and has by now nearly reached the West-European average.

2.3. THE SPATIAL PATTERN OF THE TERTIARY SECTOR IN AUSTRIA

Services offered by individual private enterprises generally tend to cluster in space. Therefore, different types of centres offering "tertiary" functions are discussed in this section.

In a historical perspective, towns in general functioned as central places for the rural hinterland, concentrating most of the service functions. This traditional model which influenced the normative Central Place Theory of Walter Christaller is now no longer valid. An updated typology of the spatial pattern of the service sector of Austria can be seen as follows:

(1) *Consumer goods and services centres* for residents, which can be ranked from small communal centres to large cities according to the different kind of service activities for household needs (including private and public services, services for traffic and other types of technical infrastructure). Their locations, hierarchies, spatial networks, their history and the development over the last three decades was analysed intensively in Austria by Hans Bobek in collaboration with Heimold Helczmanovszki and Maria Fesl (Bobek and Fesl 1978; Fesl and Bobek 1983). Vienna is placed clearly and distinctly at the top of the system of central places in Austria as the capital town with 1.56 million inhabitants in 1981. The next level in the hierarchical system is made up by the (relatively) large centres. Graz, the capital of the state of Styria is the largest of this group with 243 000 inhabitants in 1981. Just a glance at rough population figures will show the obvious discriminating difference between Vienna as the primate city of Austria and the group of large centres including, besides Graz, Linz (200 000 inhabitants; 1981), Salzburg (139 000), Innsbruck (117 000) and Klagenfurt (87 000). The economic sphere of influence of these cities is more or less identical with the political sphere of influence, because these cities are capitals of the provinces (*Land*) in the Federal Republic of Austria. In Burgenland with 270 000 inhabitants, and Vorarlberg with 305 000 inhabitants, the capitals (Eisenstadt and Bregenz) have small numbers of inhabitants (10 000

[2] Housing construction are included in this sector.

and 25 000 respectively) and their central functions are not so extended as of the other (large) capitals.[3] Therefore, the two small capitals are included in the group of larger centres, i.e. centres which dominate greater parts of a province: Villach (Carinthia), Dornbirn and Feldkirch (Vorarlberg), Krems an der Donau, St. Pölten and Wiener Neustadt (Lower Austria), Steyr and Wels (Upper Austria) and Leoben (Styria) with 24 000–53 000 inhabitants (1981). The next level in the system of consumer centres is formed by the group of middle-range centres: 95 centres with 5000–10 000 inhabitants (1981) each, belong to this group, mostly functioning as district centres for administration, specialized schools, hospitals, shopping, banks and other services. The rest are centres on the lower (482 centres) and lowest level, acting as centres for small areas only.

(2) *Tourist centres* as a subdivision of consumption centres are quite numerous in Austria. In general, they are equipped with different kinds of tourist services – accommodations, sport grounds, cable cars for skiing (in the Alps) and other services which can be used by the resident population in the tourist regions too. In rural areas, their rank as consumption centres is in general, rather low. In the last decade, a specific kind of tourism on an international basis is increasing rapidly, oriented on urban places with outstanding historic traditions like Vienna, Salzburg or Innsbruck. Vienna is the most important urban tourist centre in Austria.

(3) *Producer service centres.*[4] Scientific investigation of this type of centre has only recently started in Austria. Much of empirical work has still to be done, especially to understand their spatial functions and interrelationships. Studies for the United States, Canada and the United Kingdom show that "producer services" are mainly located in highly ranking central places (e.g. New York, Chicago, San Francisco, Los Angeles in USA). The concentration of the headquarters of big enterprises may be one of the indicators for the spatial pattern of these centres. Arguments for the "central" locations of producer services are the advantages in face-to-face contacts or excellent worldwide traffic connections. Nevertheless, producer services are not necessarily bound to central parts (the City) of large urban agglomerations. They are quite often located on the fringe of Metropolitan Areas or in the centre of industrial areas respectively. In Austria, the number of headquarters of big enterprises is rather low (Tödtling 1984) and the empirical findings for the USA and Western Europe cannot be applied directly. There is no doubt that Vienna is the most important producer service centre in Austria, followed by Graz, Linz and Salzburg. Staudacher (1987) estimated that roughly 63 000 enterprises in Austria are offering producer services,[5] amounting to 29% of all enterprises of the service sector as a whole. Based on 420 interviews in enterprises he found that the share of service-functions purchased externally in the same municipality was the highest in Vienna with more than 60%; the share decreases from level to level for central places and is less than 20% in peripheral places in the rural areas. This confirms the hypothesis according to which a distinct system of centres offering producer services exists with Vienna at the top of this hierarchy.

(4) *Political control centres.* These centres include centralized service activities connected with political control functions: legislation, public administration, jurisdiction, economic policy and international policy in general. The attractiveness of these centres is high for educated people. In Austria, a rather high share of these activities is located in the

[3] For the province of Lower Austria (belonging to the historical core area of Austria with Vienna in the centre) a new capital is created recently at St. Pölten. This town in the vicinity of Vienna (approximately 50 000 inhabitants) will attract more migrants and commuters in the near future. In this paper St. Pölten is still classified as a medium-large town.

[4] In order to identify this kind of central places they are referred to as "quaternary central places" (cf Stiglbauer 1987).

[5] Producer service units (in German *Wirtschaftsdienste*) are defined as enterprises which sell service-functions to other enterprises. Supply and demand are regulated by specific markets which have specific interacting potentials (Staudacher 1988, p. 54).

metropolitan region of Vienna (Stiglbauer 1986), followed at some distance by the capitals of the other eight provinces having their own parliaments. The province centres are also coordinating the administrative functions which are dislocated spatially, i.e. to the 92 administrative district towns of Austria, the latter being more or less identical with the middle range consumer service centres.

The four types of central service functions have been presented separately up to now. If they are to be integrated into a relevant spatial model, it must be taken into account that some place can play all four roles, or just one. An adequate and comprehensive scientific investigation of the central places and their hinterlands in Austria is not yet available.

In the following discussion three different types of regionalization providing information on central places (and partly indicating their spatial spheres of influence) will be used: (1) the regional distribution of resident employees in the tertiary sector by administrative districts (*Bezirke*) in Austria for 1981 (Bucek 1986); (2) urban regions based on the delineated daily commuting criterion (Austrian Statistical Office 1988), and (3) economic regions defined at the level of administrative districts according to the employment structure (Reiterer 1987).

Fig. 1. Share of employees in service sector: 1 – below 35.5%, 2 – 35.5% up to 39.0%, 3 – 39.0% up to 44.0%, 4 – 44.0% up to 50.5%, 5 – 50.5% up to 63.0%, 6 – 63.0% and more

Regional differences in the share of resident employees in the service sector are rather huge (Fig. 1). In Vienna and some of the larger towns the share of the tertiary sector is over 63%. However, there are also many rural districts with high rates of employment in the tertiary sector. Figure 1 shows the distribution of employees in the tertiary sector by place of residence. In fact, many employees commute from rural districts, sometimes over long distances to the urban centres, for example, from the surrounding districts to Vienna, or to the tourism centres in the alpine zones.

The urban regions referred to in the study are functional areas (Fig. 2). The Austrian Central Statistical Office defined the 42 urban regions as regions with one (or more) urban municipality in the core with 10000 inhabitants as a minimum. Suburban communities are included in an urban region, if the share of daily out-commuters to the centre is higher than 25%. An urban region must have 15000 inhabitants as a minimum. For these regions statistical data are available for the resident and for the working population. Table 2 shows data for four classes of urban regions. The urban region of Vienna with 2.04 million inhabitants is the largest. The category of "large urban regions" corresponds to the "large"

Fig. 2. Urban regions: 1 – Vienna, 2 – large urban regions, 3 – medium urban regions, 4 – small urban regions

TABLE 2. Population and employment by urban regions, 1981 (per cent)

Urban regions	Resident population	Resident employees	Working employees	Resident employees in tertiary sector	Working employees in tertiary sector
Wien (Vienna)	27.06	27.83	30.87	36.54	36.65
Large urban regions	19.46	19.86	22.20	23.99	24.65
Medium urban regions	9.75	9.73	10.15	9.30	9.56
Small urban regions	10.30	9.95	10.04	8.26	8.18
All urban regions	66.57	67.38	73.26	78.09	79.03
Outside urban regions	33.43	32.62	26.74	21.91	20.97
Total	100.00	100.00	100.00	100.00	100.00

Source: Census 1981.

consumer service centres, i.e. the big capitals: Graz, Linz, Salzburg, Innsbruck und Klagenfurt, each with more than 100 000 inhabitants in the urban region.

The "medium urban regions" are nearly identical to the "larger" centres of the consumer type (Dornbirn, Feldkirch-Rankweil, Krems a.d.D., Leoben, St. Pölten, Steyr, Wels, Wiener Neustadt and Villach). The two smaller and insufficiently equipped capitals of Bregenz and Eisenstadt are also classified as "medium urban regions". The group has an average of 67 000 inhabitants per urban region. The rest of the urban regions are referred to as "small urban regions". All other communities not belonging to urban regions can be interpreted as rural areas.

According to the figures presented in Table 2, two thirds of the Austrian population are living in urban regions, and more than a quarter in the urban region of Vienna. The shares of the resident employees are roughly the same, while the shares of working employees[6] are

[6] Working employees (*Arbeitsbevolkerung*) equals the number of resident employees minus out--commuters plus in-commuters. The difference between resident and working employees for Austria as a whole shows the net-difference of in- and out-commuting across international borders.

significantly higher for the large urban regions owing to extensive commuting. Table 3 shows the share of the tertiary sector in each class of urban regions. Vienna has the highest rate in the tertiary sector (55.1%), followed by the group of "large urban regions" (50,7% of all resident

TABLE 3. Economic structure of resident employment in the urban regions, 1981

Urban regions	Resident employees in sectors (per cent)			
	primary	secondary	tertiary	total
Wien (Vienna)	4.09	40.80	55.11	100
Large urban regions	6.95	42.37	50.68	100
Medium urban regions	7.09	52.81	40.11	100
Small urban regions	9.96	55.20	34.84	100
All urban regions	6.23	45.12	48.64	100
Outside urban regions	19.96	51.85	28.18	100
Total	10.71	47.32	41.97	100

Source: Census 1981.

TABLE 4. Development of the number of resident employment in the tertiary sector in urban regions between 1971 and 1981

Urban regions	Resident employment in tertiary sector		1971 = 100
	1971	1981	
Wien (Vienna)	489 160	507 961	103.84
Large urban regions	296 800	333 484	112.36
Medium urban regions	114 055	129 292	113.36
Small urban regions	103 228	114 895	111.30
All urban regions	1 003 243	1 085 632	108.21
Outside urban regions	295 457	304 560	103.08
Total	1 298 700	1 390 192	107.04

Source: Census.

employees), while the residual areas outside the urban regions have an average of 28.2% only. This share is mainly due to the areas of dominant tourism as well as by the well equipped, lower-level consumer service centres in semi-industrialized areas (see Fig. 1).

Table 4 shows the development of the resident employment in the tertiary sector between 1971 and 1981. In the "medium large urban centres" the rate of development was the highest, followed by that of the large urban regions. In Vienna, the increase of the resident employment was below the Austrian average. The figures show the rapid development of the service sector in all regions of Austria between 1971 and 1981.

The delireation of economic regions in Austria by A.F. Reiterer (1987) is based on the employment structure by administrative districts (*Bezirke*) and the result of using a regionalization procedure based on main component analyses. On the basis of this classification an extended analysis of the spatial dynamics in tertiarization in Austria is feasible. "Urban centres" in Reiterer's regionalization include Vienna with the suburban zone in the South and

West, the group of "large centres": Graz, Linz, Salzburg, Innsbruck and Klagenfurt and the group of "larger centres" (without Leoben and Steyr). Nearly half of all the employees are residents in the "urban centres".

TABLE 5. Development of working employment in economic regions, 1971–1981

Economic regions	Number of working employees		Share of total employment			
			1971		1981	
	1971	1981	I–II	III	I–II	III
Urban centres	1 444 801	1 597 484	48.28	62.64	37.43	59.39
Centres of textile industry in Vorarlberg	53 167	62 090	1.78	1.32	2.12	1.58
Old industrial areas	220 643	235 810	7.37	5.48	8.80	5.52
Regions with dominant tourism	376 233	443 645	12.57	11.80	13.16	13.18
Industrial-agrarian periphery	541 971	576 678	18.11	11.86	22.84	12.93
Agrarian periphery	355 659	344 814	11.89	6.90	15.65	7.40
Total	2 992 474	3 260 521	100.00	100.00	100.00	100.00

Source: Census, Reiterer 1987.
I II = primary and secondary sector, III = tertiary sector.

Table 5 shows the share of the working employees for 1971 and 1981 in the economic regions. About 60% of all employees in the tertiary sector of Austria work in the "urban centres". This share decreased between 1971 and 1981 from 62.6 to 59.4% as a result of a shift of service sector employment to all other regions especially to the regions with dominant tourism activities. This means that in the smaller urban places and in the rural areas employment within the tertiary sector increased (relatively and absolutely). This process is based mainly on the development in consumption services: the establishment of new schools, banks and hospitals, public administration services, traffic-services etc. There was clearly a process of modernization and development with positive effects on the labour market outside the large urban centres. Table 5 shows also the deindustrialization of the "urban centres" between 1971 and 1981 and the increase of the number of jobs in the secondary sector outside urban centres.[7]

3. REGIONAL POPULATION DEVELOPMENT IN AUSTRIA AND THE SERVICE SECTOR

The analysis of the spatial structure of the tertiary sector shows different distributions for the different service functions. In the following section the way in which spatial development of the tertiary sector influences the development of the population and its distribution will be examined. Given the high proportion of this sector and its dynamic development it should have certain impact upon spatial population patterns. However, difficult methodological problems arise in evaluating the concrete effects of tertiarization on demographic behaviour. Some preliminary results based on aggregate data are presented below.

[7] Shares of the service sector in 1981 for the different *Bundesländer* (provinces) in Austria (average 50.5%): Vienna – 65%, Salzburg – 58.1%, Tirol – 57,6%, Carinthia – 52.2%, Styria – 45.4%, Lower Austria – 44.8, Vorarlberg – 42.3%, Upper Austria – 41.8%, and Burgenland – 39.1% (Bucek 1986).

3.1. REMARKS ON THE CRUDE RATES OF POPULATION DEVELOPMENT IN AUSTRIA

Table 6 shows the development of population in Austria since 1951 on the basis of Census data up to 1981. Since 1971 the Austrian population has been on the verge of stagnation. Recent projections up to 1990 indicate a small increase between 1981 and 1990 (of 90 000 persons) and a stagnation for the period of 1990–2001. If there is no change in the pattern of international migration, the Austrian population will drop to the 1971 level during the first decade of the next century. However, the assumption of stability in the international migrational pattern has to be revised. In the near future Vienna especially will most probably gain considerably in terms of international migration.

TABLE 6. Population development 1951–1987, projections until 2011

Year	Resident population	1951 = 100	Resident employees	1951 = 100	Employed males (%)
1951	6 933 905	100.00	3 347 100	100.00	61.18
1961	7 073 807	102.02	3 369 810	100.68	59.64
1971	7 491 523	108.04	3 098 000	92.56	61.43
1981	7 555 338	108.96	3 147 400	94.03	59.65
1987	7 575 732	109.26	3 455 000	103.22	59.88
1990	7 640 800	110.19	3 487 100	104.18	.
2001	7 642 000	110.21	3 506 700	104.77	.
2011	7 522 000	108.48	3 557 008	106.27	.

1951 and 1961: Census; 1971–1987: Microcensus (annual average); 1990–2011: projections.
Sources: Census, OROK 1987.

The crude rates of population development for Austria are the balance of two different demographic regimes (see Table 7). In the Eastern parts of Austria with Vienna (demographic Zone A with 58.5% of Austrian population[8]), the natural population development can be characterized as an advanced stage of the aging process with low birth- and death rates. Significant effects are generated only by changes inmigration, connected these days with inmigration from abroad, following the political changes in Eastern Europe.[9] In the Western and Southern parts of Austria (demographic Zone B) population was increasing up to the 1980s as a result of relatively high fertility. Migration from the Eastern parts to the Western parts of Austria had never any importance. The aging process is now proceeding in the Western parts too, combined with decreasing fertility rates. This will reduce the population growth in the next decades.

3.2. POPULATION DEVELOPMENT IN THE URBAN REGIONS

Table 7 shows differences in population development between 1961 and 1981 for urban regions and rural areas by the two demographic zones. The population of Vienna more or less stagnated between 1961 and 1981. It can be expected that the results of the 1991 Census will show a small increase in the population number again due to foreign inmigration. The "large urban regions" in the demographic Zone A had increased remarkably between 1961 and 1971

[8] Demographic Zone A: Vienna, Lower Austria, Burgenland and Styria and the urban region of Steyr in Upper Austria; demographic Zone B: the western and most southern rest of Austria.

[9] The impact of the large inmigration of young people to Vienna and to the industrial agglomerations in the eastern parts of Austria around 1900, with its effects on population reproduction in the early decades of the century (Vienna had more than 2 million inhabitants just before the First World War) and its effect on the age-structure in the 1960s and 1970s (extreme aging) has now nearly vanished.

TABLE 7. Population development in urban regions, 1961–1981

Region	Zone	1961	1971	1961 = 100	1981	1971 = 100	1981 = 100
Wien	A	2 084 650	2 108 738	101.16	2 044 330	96.95	98.07
Large urban regions	A	364 350	391 661	107.50	394.981	100.85	108.41
	B	872 199	1 007 588	115.52	1 075 410	106.73	123.30
	Total	1 236 549	1 399 249	113.16	1 470 391	105.08	118.91
Medium urban regions	A	367 288	387 461	105.49	388 625	100.30	105.81
	B	272 347	322 407	118.38	347 828	107.88	127.72
	Total	639 635	709 868	110.98	736 453	103.75	115.14
Small urban regions	A	356 474	373 413	104.75	369 298	98.80	103.60
	B	346 557	392 565	113.28	409 058	104.20	118.03
	Total	703 031	765 978	108.95	778 356	101.62	110.71
All urban regions	A	3 172 762	3 261 273	102.79	3 197 234	98.04	100.77
	B	1 491 103	1 722 560	115.52	1 832 296	106.37	122.88
	Total	4 663 865	4 983 833	115.52	5 029 530	106.37	122.88
Rest	A	1 237 682	1 246 767	100.73	1 218 257	97.71	98.43
	B	1 172 260	1 260 923	107.56	1 307 551	103.70	111.54
	Total	2 409 942	2 507 690	104.06	2 525 808	100.72	104.81
Zone A	A	4 410 444	4 508 040	102.21	4 415 491	97.95	100.11
Zone B	B	2 663 363	2 983 483	112.02	3 139 847	105.24	117.89
	Total	7 073 807	7 491 523	105.91	7 555 338	100.85	106.81

A = demographic zone with stagnation or decrease in population development, B = demographic zone with increasing population development.

Source: Census.

but stagnated in the following decade. In contrast, population increased in the "larger urban regions" in Zone B during both decades, although less rapidly in the 1970s. The picture of development in the "medium urban regions" is similar to the one described for the large urban areas. It should be noted that the medium urban regions in Zone B had the highest increases in population since 1961. The "small urban regions" in Zone B were also characterized by intensive development. Population in the areas outside the urban regions declined in Zone A and increased in Zone B following the general temporal trend.

TABLE 8. Population development in urban regions, 1961–1981

Urban regions	1961–1971		1971–1981	
	natural increase	net migration	natural increase	net migration
Wien	−3.4	4.6	−6.4	3.3
Large urban regions	6.5	6.4	1.5	3.8
Medium urban regions	7.3	3.7	1.6	2.1
Small urban regions	8.9	−0.4	2.4	−0.4
Outside urban regions	9.3	−4.9	3.0	−2.5
Austria (average)	4.8	1.1	−0.1	1.0

Source: Census.

Table 8 shows components of population development for the two decades. In the case of Vienna, the natural increase was negative and migration balance positive in both periods. Without migration, the population of Vienna would have decreased by 3.4% between 1961 and 1971 and by 6.4% between 1971 and 1981. Although net migration was still positive in the 1970s with 3.3%, a decline in total population occurred during this period. In the "large urban regions" both components of population development were positive in the two decades, with especially high rates of inmigration. The "medium urban regions" had a high natural increase between 1961 and 1971, but were less attractive as centres of inmigration. The "small urban regions" have been losing population since 1961 due to migration. Nevertheless, a high positive natural increase led to positive total population change during both periods.

3.3. POPULATION DEVELOPMENT IN ECONOMIC REGIONS

The regionalization by Reiterer (1987), based on the employment structure at place of work allows one to demonstrate differences in population development between various types of economic areas (see Table 9 and Fig. 3).

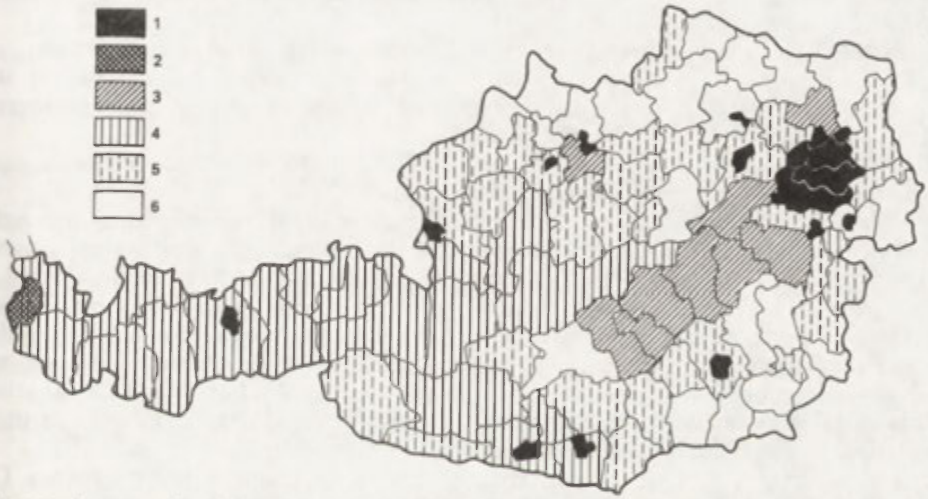

Fig. 3. Socio-economic regions: 1 – centres with pronounced tertiary sector, 2 – regions in Vorarlberg with dominant textile industry, 3 – old industrial areas, 4 – regions with dominant tourism, 5 – industrial-agrarian (semi-) periphery, 6 – agrarian periphery

TABLE 9. Components of population development in economic regions, 1971–1981

Economic regions	Resident population		Components of development		
	1971	1981	natural increase	net migration	total
Urban centres	2 886 000	2 826 400	−5.00	2.90	−2.10
Centres of textile industry in Vorarlberg	132 400	146 700	10.40	0.40	10.80
Old industrial areas	604 000	598 700	−0.20	−0.60	−0.90
Regions with dominant tourism	1 110 700	1 185 800	5.80	1.00	6.80
Industrial-agrarian periphery	1 671 700	1 711 400	2.10	0.30	2.40
Agrarian periphery	1 085 900	1 085 200	2.00	−2.10	−0.10
Total	7 491 000	7 555 500	−0.10	1.00	0.90

Source: Census, special analysis by A.F. Reiterer, M.A.

In the group of "urban centres" the stagnation of the population in Vienna and Graz caused a decrease, particularly due to the negative birth/death balance. The "old industrial areas" also lost population in absolute terms. In contrast, the regions with dominant tourism functions in the Western parts of Austria had a strong increase between 1971 and 1981, mainly due to high natural increase. The peripherial regions with industrial basis increased their population during the 1970s while the agrarian peripherial regions lost population due to outmigration.

4. SUMMARY AND CONCLUSIONS

This paper discusses the spatial economic aspects of population development in Austria. One of the driving forces of the economic development is the growth of the service sector which is currently undergoing huge structural changes. Looking at employment projections for Austria as a whole it can be expected that the service sector in general, will still increase in the future, reaching at least shares similar to those which can be observed currently in Western European countries.

This will have a strong impact on regional labour market development, namely:

(a) In the largest cities the rapid increase of producer services and of political and economic control functions (quarternary services) will lead to an upsurge of the number of skilled jobs attracting highly educated persons;

(b) In the medium-sized cities the tertiary functions, mostly connected to consumption, will probably show an increase, but at a limited level;

(c) The third type of areas characterized by the development of service activities are tourist regions. In parts of the Alps the phenomenon of overcrowding might limit further growth.

The main effects of these tendencies on regional population dynamics can be sketched as follows: With general stagnation of population growth in Austria as a whole, migration will have the most pervasive effect on future regional population distribution. It is quite possible that the attractiveness of Vienna as an expanding centre of quarternary functions will stimulate inmigration from other parts of Austria and from abroad. For the other large urban regions in Austria, inmigration will lead to an increase in the number of inhabitants or to a reduction of the negative natural population development.

In addition, commuting will influence the growth of urban regions in their peripheries. The large urban regions now have modern traffic facilities allowing commuting over long distances. Therefore, the development of the service sector in these regions will not only generate inmigration, but will also stimulate the development of commuting areas. These conditions are typical of Vienna and its hinterland. A specific development will occur in the western parts of Austria where in the near future population will be subject to a rapid aging process.[10]

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[10]The author acknowledges the help of Elisabeth Aufhauser M.A. in preparing the English language version of the paper.

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REGIONAL POPULATION PROJECTIONS: A MULTIPLE BASE-POINT APPROACH

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1. INTRODUCTION

Statistical agencies, both national and international, have for decades relied on the cohort-survival analysis as a means of generating regional population projections. Such projections, adjusted on the basis of net interregional migration flows, usually involve alternative, although rather conservative, assumptions concerning fertility, mortality and mobility patterns, and are typically presented in the form of high, medium, and low population forecasts (*International Encyclopedia of Population*, 1982). Some authors, however, have experimented with a range of unlikely assumptions, i.e. such that represent departures from recent demographic trends. In particular, Wolf *et al.* (1988) have constructed a set of future population scenarios for Europe which include major "surprises": a new baby boom around the year 2000, a rapid decline in fertility rates, a decrease in mortality owing to a "magic drug", a major AIDS epidemics, and a new wave of immigration. Results of those scenarios are then presented against a "conventional wisdom" projection – a medium variant of the United Nations population forecasts. As the authors have found, the shortlasting dramatic events (such as a new baby boom or an immigration wave) do not lead to abrupt shifts in the path of population growth, while moderate but steady changes in basic demographic parameters tend to generate very large differences in the alternative population futures.

As Wolf *et al.* (1988, p. 23) point out, their analysis allows to emphasize one of the basic components of demographic change at a time. Whatever the future holds, however, it will involve simultaneous shifts in fertility, mortality and migration levels. Some aspects of such an interaction are accounted for in the multiregional models which explicitly introduce inmigration and outmigration by age of migrants into the population accounting systems (Rogers 1975; Willekens and Rogers 1978, Rees and Wilson 1977; Willekens and Drewe 1984). For example, spatial mobility is treated in this framework as a function of the age composition of the population. Early applications of the multiregional models (summarized in: Rogers and Willekens 1985) for a number of countries were, as a rule, based upon the assumption of constant, age-specific rates of fertility, mortality and interregional migration, as observed over the basic period, normally a year. More recent studies have experimented with alternative demographic assumptions and have used alternative spatial systems of reference. Three such attempts, reported in fairly fugitive publication sources, shall briefly be recapitulated below.

Korcelli and Just (1983) analysed some possible future trajectories of population change for the Republic of Korea using a disaggregation into rural, metropolitan, and other urban populations. Five scenarios were developed, based upon observed trends as well as on some

general concepts, such as the hypothesis of the mobility transition (Zelinsky 1971) and of hierarchical migrations (Korcelli 1981). Specific rates were determined so that the experience of countries characterized by more advanced stages of the demographic transition was taken into account. In the study referred to fertility and migration patterns for the Tokyo region, and mortality schedules for the whole of Japan, were treated as models at individual phases of projection runs. The first run represented a constant rate projection using the observed data for 1970 as the input. In the second run, "the balanced urbanization scenario", a decline in fertility and mortality was assumed to follow, with a 35 year lag, the experience of Japan. The third run, based on the same assumptions concerning fertility and mortality change, introduced a modified migration matrix, one in which population outflows from the rural to the metropolitan areas (Seoul and Pusan) were some 50% above the observed level. Those assumptions were supplemented in the fourth run by the assumed decrease in the fertility level of the metropolitan population. The fifth, "metropolitan transition" scenario, in addition to all the assumptions contained in the previous projections, explored the impact of a non-linear evolution of migration rates, in particular of a sharp increase and then a decrease in rural-to-metropolitan migrations. When compared with the other projection runs, the fifth scenario generates the lowest total population numbers while allocating their highest shares to the metropolitan areas. Thus, under given fertility and mortality patterns, the most considerable contraction of growth rates of the total population, in comparison to the trend-based as well as more comprehensive United Nations projections for South Korea, was achieved by assuming a rapid acceleration of metropolitan population growth (Korcelli and Just 1983, p. 24).

Usbeck (1985), in a study of the spatial population system of the GDR, used alternative fertility, mortality and migration assumptions within a policy context. The main question to be answered related to the sensitivity of the system with regard to varying mobility and fertility patterns which, in turn, were shown to be influenced by housing policies and by various measures of social welfare. In one scenario (out of the total number of six), Usbeck attempted to identify a set of assumptions which would bring about a halt to the long-term demographic decline of the southern region, with its cities and major industrial centres of Leipzig, Halle and Dresden. These assumptions included an increase in the fertility rates in the South to match the national average, a decrease in outmigration rates from the region by 20% between 1985 and 2000, and a corresponding increase in its inmigration rates by 30% when compared with the observed (1975) rates. However, even such major hypothetical shifts failed to change the population balance of the South from negative to positive over the projection period, i.e. until the year 2030. The retention of the population within the region turned out to be a very difficult problem owing to the observed, self-reinforcing syndrome of demographic contraction – a sizeable migration loss accompanied by low fertility and the advanced ageing of the population. Similar questions appeared in another set of similation runs, in which settlement-size categories rather than administrative regions were used (Usbeck 1985, p. 19–24). A hypothetical decrease in inmigration by 30%, together with an increase in outmigration by 30%, were not strong enough measures to reverse the observed trend towards the concentration of the population of the GDR within urban centres of 50000 inhabitants or more.

More conservative assumptions were tested in multiregional population projections for Austria (Sauberer and Spitalsky 1987). A slight (3% over a five-year period) decrease in the number of deaths; observed versus somewhat decreased fertility rates (down to the level actually observed for low-fertility regions), decreased (equal to one half of the observed drop over the two five-year periods immediately preceding the base-year) versus observed internal migration rates; finally, observed versus reduced (by one half) net gain with regard to international migrations, were all the assumptions employed to generate the total of five development scenarios. Not surprisingly, differences between the highest and the lowest projection for the four major regions of Austria amounted to only 3–5% by the year 2011. Unlike in the case of some of the exploratory studies referred to earlier, the assumptions used

by Sauberer and Spitalsky (1987) were meant to be "realistic". In fact, they were applied to a country characterized by a fairly stable spatial population system.

The present paper departs from the general practice so far followed in studies that focused on alternative multiregional population projections. Rather than experimenting with a set of more or less arbitrary assumptions, the paper identifies a series of base points (i.e. base years) and interprets the corresponding observed demographic patterns as alternative model patterns on which consecutive projection runs are based. Such an approach offers several advantages but is also characterized by few limitations. As to the former aspect, it allows to eliminate all inconsistencies in the base data configurations which normally arise when arbitrary assumptions are used. It also enables us, by the way of analogy, to better evaluate those projections that are built on single base-point data. On the other hand, the multiple base-point approach is "non-theoretical" when confronted with some previously mentioned attempts to test assumptions derived from the general concepts of spatial population development. Even more importantly perhaps, for the results to be transparent, and policy-relevant, a fairly large temporal variations within the observed data should be identifiable. As it is demonstrated in the following section, such a precondition is fulfilled in the present study which is based on data for Poland.

2. ALTERNATIVE POPULATION PROJECTIONS

The early 1980s have witnessed major shifts in the demographic patterns in Poland, both at the national and regional levels. The conspicuous developments include, in particular, a fertility bulge and a rapid contraction of spatial mobility of the population. Gross Fertility Rate which stabilized at the 2.200–2.270 level during the 1970s, increased to 2.416 in 1983, and decreased again to 2.329 in 1985 and 2.217 in 1986. In the case of the urban population, the corresponding rates were: 1.770 in 1975, 1.928 in 1980, 2.137 in 1983, 2.045 in 1985 and 1.936 in 1986. Internal migration rates, on the other hand, have shown a continuous decline since the late 1970s: from 27.7 in 1978 to 25.2 in 1980, 19.7 in 1983, and 17.5 in 1985. Life expectancy at birth has failed to be increased over the last ten years; it has instead shown minor fluctuations: from 67.27 years for males and 75.02 years for females in 1975/76 to 67.04 and 75.16 years in 1983 and to 66.76 and 75.13 years in 1986, correspondingly. While no satisfactory explanation has so far been offered with respect to the fertility bulge of the early 1980s, the plummeting of internal migration is generally attributed to the socio-economic crisis, mespecially the dwindling rates of housing construction (cf. Korcelli 1988). Needless to say, the rapid demographic change has made even the recent population forecasts for Poland rather obsolete. This sets the stage for the discussion on future implications of those changes.

The 49 voivodships, i.e. administrative units of the upper level, were grouped into 13 regions. In this paper, the attention is focused on five out of those regions (Warsaw, Łódź, Cracow, Katowice and Gdańsk), which represent the major urban regions of Poland. Multiregional projections were calculated according to: Willekens and Rogers (1978), on the basis of the data for: 1977, 1978, 1981, 1983, 1984, and 1985. This allows to trace, over the projection period, the consequences of recent demographic shifts, as well as to test the sensitivity of the model used with respect to variations in the input data.

Table 1 demonstrates the impact of changing fertility levels, and of evolving intensity of internal migration, upon the projected total population of Poland. For each of the projection, runs the five-year rates of growth are positive and declining over time, but differences between the lowest (1978-based) and the highest (1983-based) trajectory seem to be very substantial. On the interregional scale, the demographic patterns of the late 1970s implied a rapid concentration of the population within the main urban regions (see Figs 1–11). Their combined size would increase, according to the 1978-based projection series, from 9.4 million in 1978 to 10.9 million in 1990 and 11.9 million in the year 2000, and their corresponding share from 26.8 to 28.3 and 29.4% of the total population of Poland. These

TABLE 1. Alternative projections of the total population of Poland: five-year rates of growth

Projection period	Projection base					
	1977	1978	1981	1983	1984	1985
1980	1.050	1.047	1.046			
1985	1.041	1.037		1.047	1.041	1.036
1990	1.031	1.028	1.034	1.036	1.033	1.030
1995	1.026	1.025	1.028	1.033	1.031	1.030
2000	1.025	1.024	1.027	1.033	1.032	1.031
2005	1.026	1.026	1.027	1.037	1.034	1.032
2010	1.023	1.021	1.026	1.033	1.030	1.027
2015	1.018	1.016	1.020	1.030	1.027	1.025
2020	1.014	1.014	1.017	1.028	1.026	1.024
	1.013		0.015			

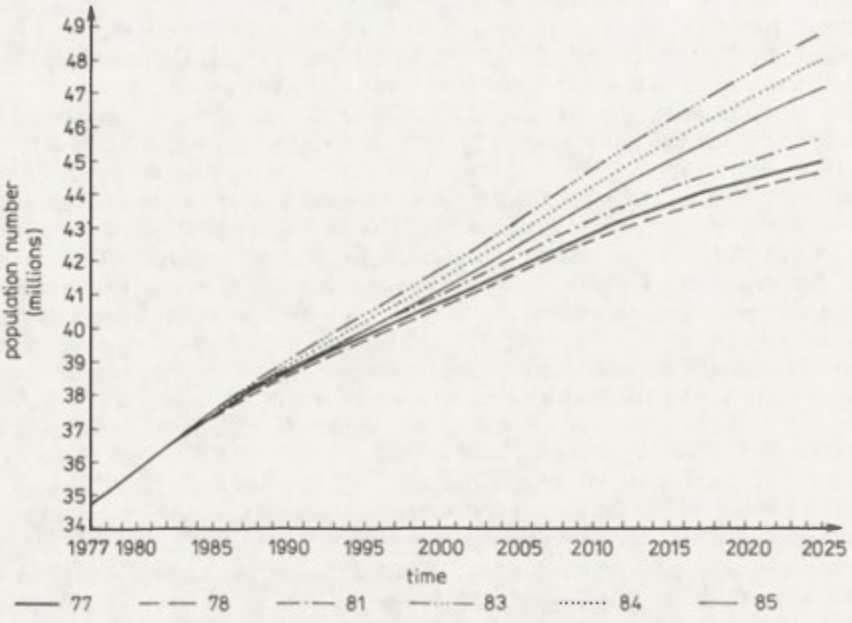

Fig. 1. Alternative population projection – Poland

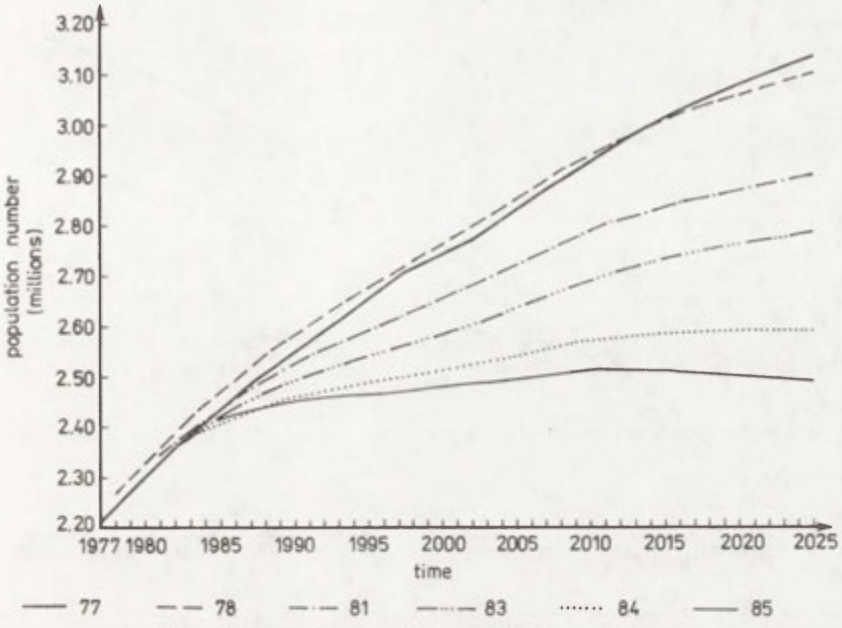

Fig. 2. Alternative population projection – Warsaw

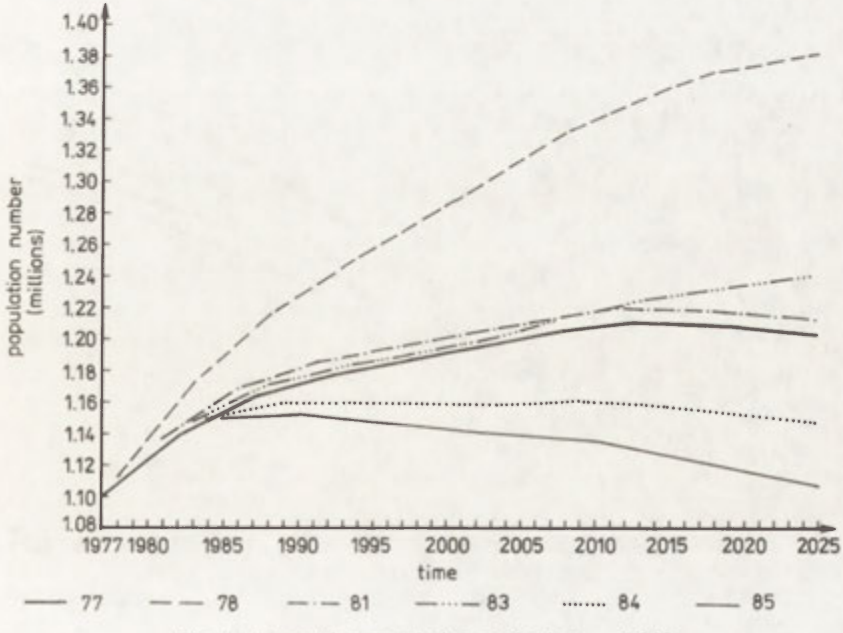

Fig. 3. Alternative population projection – Łódź

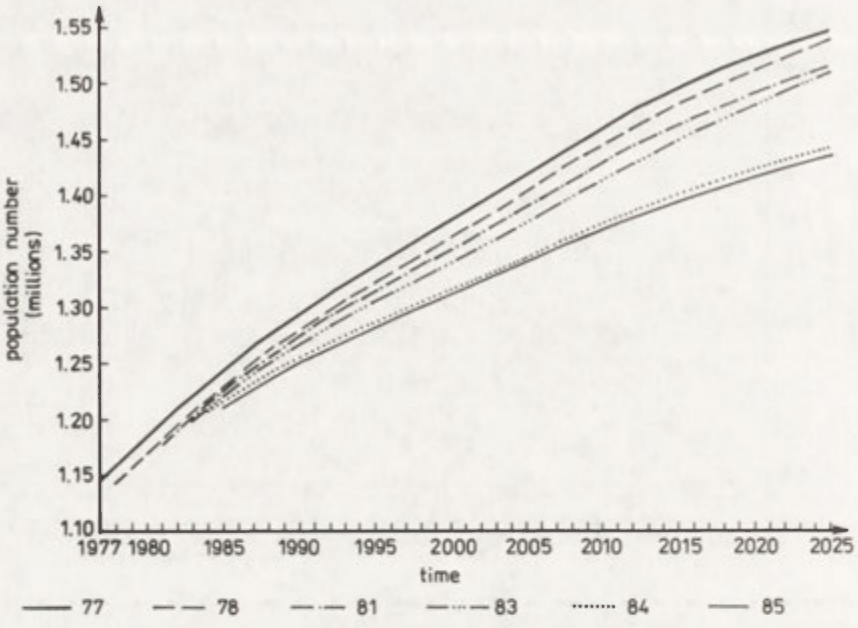

Fig. 4. Alternative population projection – Cracow

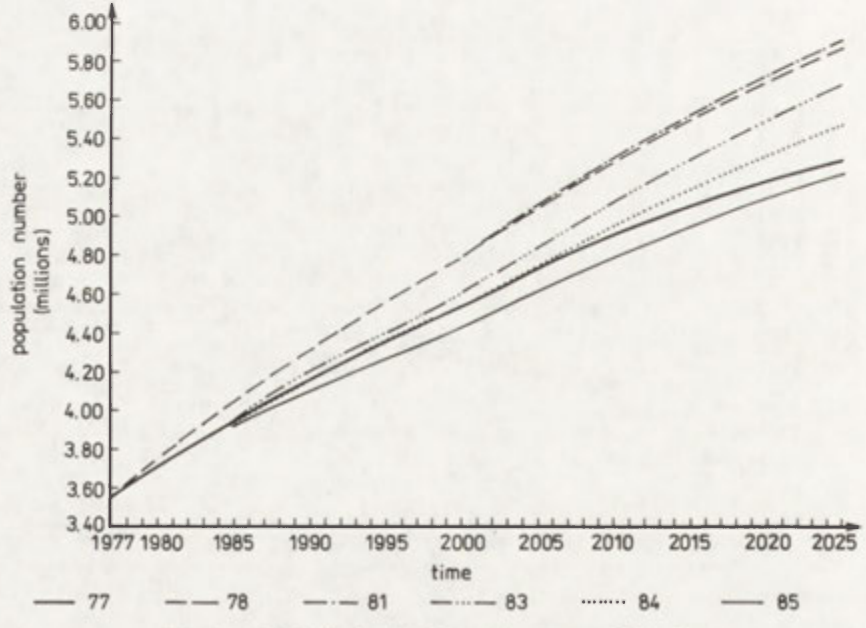

Fig. 5. Alternative population projection – Katowice

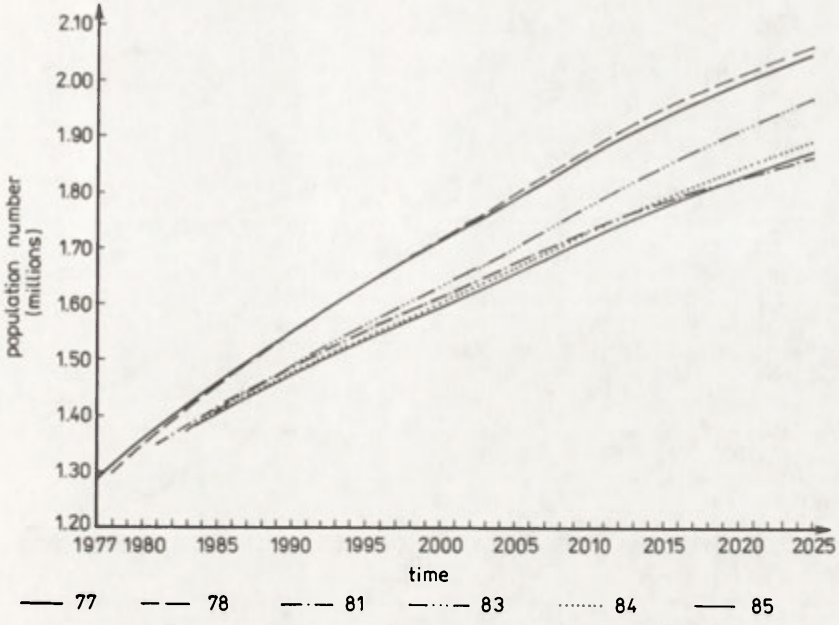

Fig. 6. Alternative population projection – Gdańsk

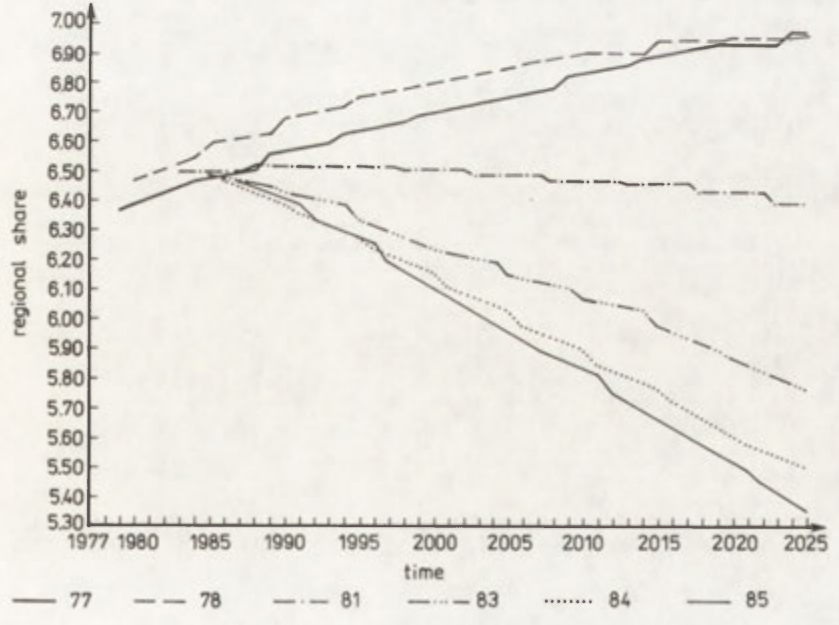

Fig. 7. Alternative population projection – Warsaw

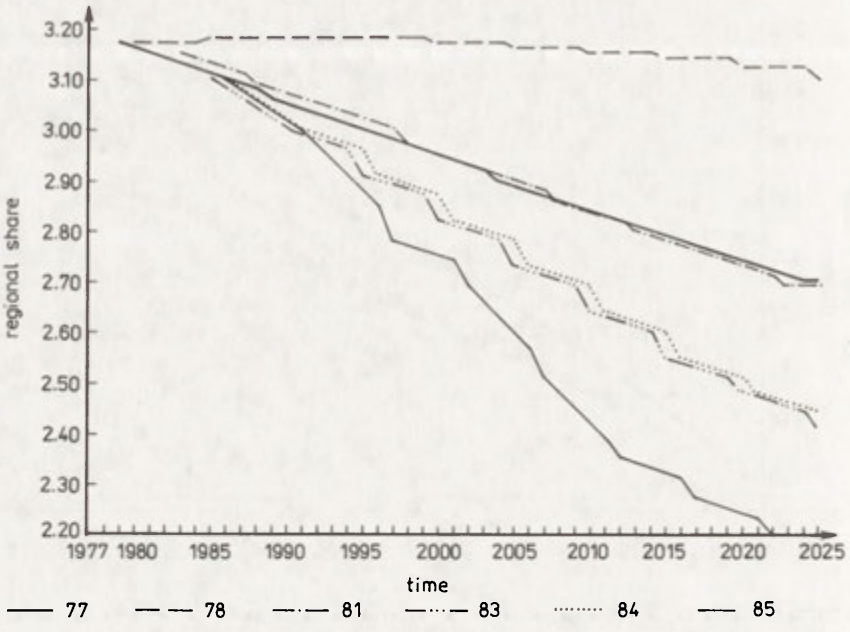

Fig. 8. Alternative population projection – Łódź

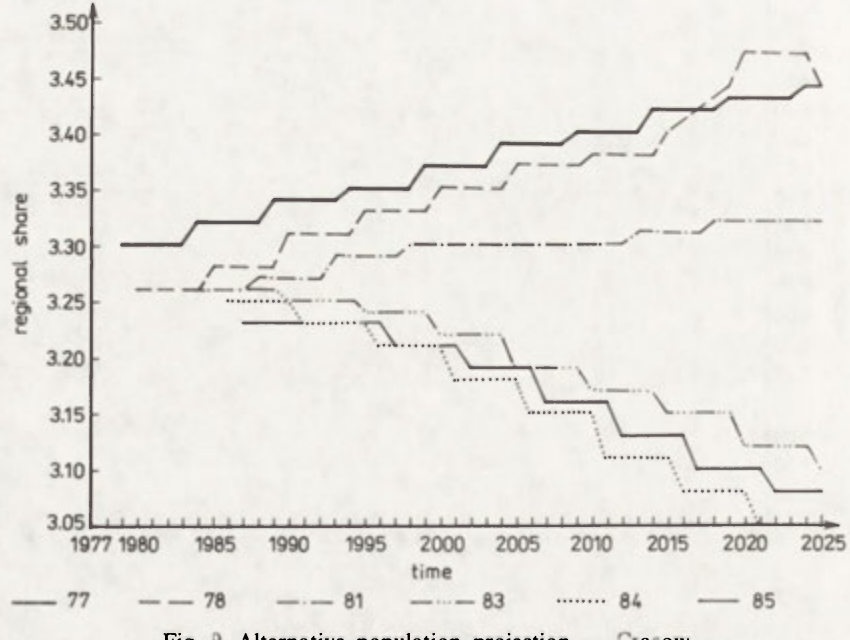

Fig. 9. Alternative population projection – Cracow

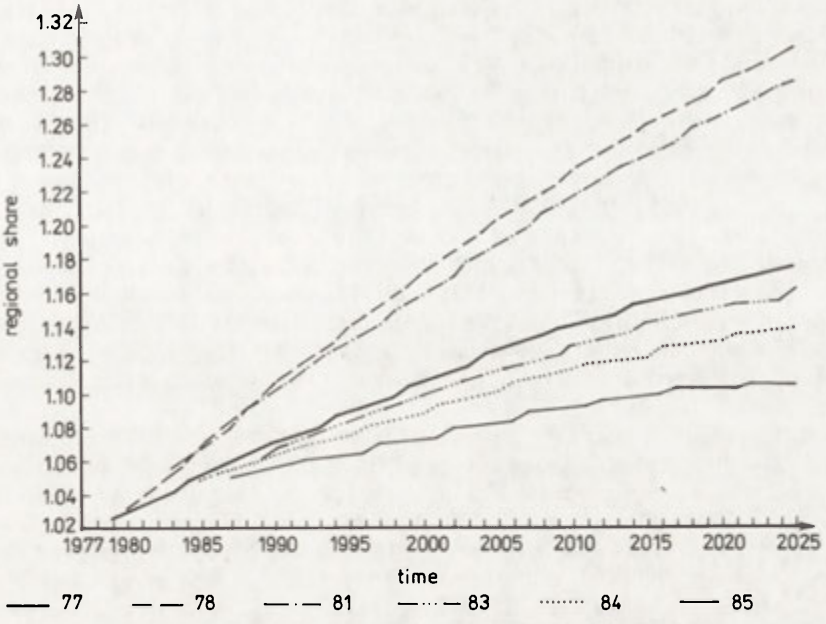

Fig. 10. Alternative population projection – Katowice

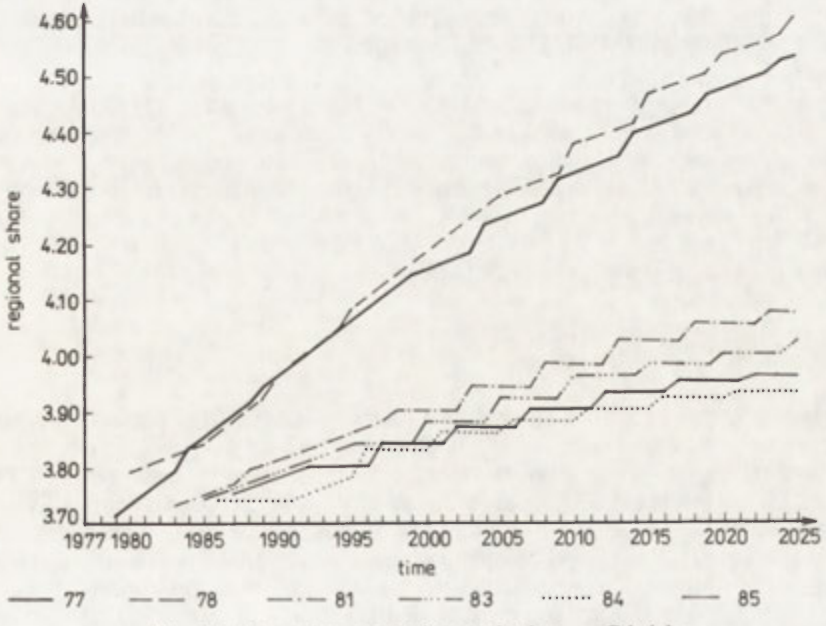

Fig. 11. Alternative population projection – Gdańsk

results are *de facto* in accord with the spatial planning doctrine of the 1970s, which aimed at a "moderate polycentric concentration", and provided for a net transfer of about three million people from rural to urban places, as well as disproportionately high rates of growth in the major urban agglomerations during the 1980s and the early 1990s (Opałło 1986).

Those policies were discontinued at the onset of the socio-economic crisis, i.e. by 1980. Internal migration rates (rural-to-urban migration in particular) begun to shrink, the development which is reflected in smaller additions to the number of inhabitants of the five urban regions according to the 1981-based projection. This decline, however, was not large enough to involve a decrease in their share within the total population. Migration trends were, in fact, counterbalanced by an increase in fertility rates in the urban areas as well as a drop in fertility of the rural population between 1978 and 1981. A point of turnaround, in terms of the interregional population redistribution, was for the first time generated by the data from 1983. In spite of a continuing fertility growth in the urban population, a sharp decrease in net migration gain produced a stabilization of the share of the five urban regions at the level of 27.2%.

A further decline in spatial population mobility, including the inflow to large cities, combined with a drop in fertility rates between 1983 and 1985, imply a future decrease in the share of the five urban regions (from 27.0 to 26.7% between 1985 and 2000) within the total population of Poland. Also, according to the 1985-based projection, two urban regions would be loosing population in absolute terms before 2020. The two regions, Warsaw and Łódź, can be defined as demographically "old". The age composition of their populations is characterized by lower percentage of the 0–15, and higher percentage of the 65 plus age categories, when compared with the corresponding structures in the Cracow, Katowice, and Gdańsk regions. Still, the temporal sequence of the alternative population trajectories for individual regions is basically stable, while interregional differences are mainly of the level rather than trend (see Figs 1–11). This regularity in the projected patterns of population change seems to represent a non-trivial finding in the face of a non-linear evolution of fertility rates over the recent past. When taken as an aggregate, the five urban regions experience progressively lower albeit still positive rates of growth according to the consecutive projections, and their share in the total population of Poland is shown to expand, stabilize, and slowly decrease. The 1983-based projection series represents a point of transition, from spatial concentration, as evident in the 1977, 1978, and, to a lesser degree, the 1981-based projections, to spatial deconcentration, as implied by the 1984 and the 1985 data.

The shift from the 1977-based to the 1985-based projection series appears to be driven to a large extent by a decline in spatial mobility of the population. This especially applies to the evolution of regional shares, and, in the case of the absolute population size, to a relatively short-term perspective. Thus, the falling migration gains produce lower absolute population growth in the urban regions despite a parallel increase in urban population fertility rates. This trend is discontinued after some fifty years, when the second-generation fertility increase is superimposed upon the first-generation effect.

3. EVALUATION

Discussion in this paper has focused on two measures of spatial population change: the absolute increments/decrements and regional shares; and on the role of two demographic factors: internal migration and fertility. Actually, the model used in the present study requires and generates, in the projection series, a disaggregation of the population by five-year age groups along with age-specific fertility, mortality, and the age, as well as the origin/destination specific migration data. One should emphasize that the model assumptions concerning spatial allocation of fertility rates may bear heavily on the results of projections. It is, namely, assumed that migrants adjust instantly to fertility levels as prevailing at the region of destination. Hence, net migration from high-fertility to low-fertility regions produces

a contraction of population growth within the spatial system as a whole. The system is, in fact, a closed one, since it disregards foreign migrations. The elimination of this deficiency is technically feasible but was not attempted owing to a lack of reliable data on emigration. Population projections for the Katowice region (i.e. Upper Silesia) which is an origin of sizeable foreign migration streams, should be regarded as inflated when compared with projections for the remaining regions.

Keyfitz (1982) presented a number of reasons why valid demographic research, which produces important theoretical relations, cannot be usefully incorporated in population forecasts. This leads him to conclude that: "Pending the discovery of a truly behavioural way of estimating the future, we cannot afford to be ashamed of extrapolating the past from observed statistical regularities" (Keyfitz 1982, p. 30). Against this background, one should return to the question of the utility of dealing with a series of consecutive projections rather than with "traditional", one base-point projections that incroporate hypothetical values of one or more demographic parameters. In addition to the advantages earlier identified, the "moving" projections seem better suited to depict the way in which past demographic trends may be reflected in the future (see also: Korcelli 1987). In other words, such projection series may help to find out some regularities in the observed data. To use an example from the present paper, one should note that recent spatial population changes in Poland are often believed to reflect fluctuations, or perturbations in secular demographic trends. However, when extrapolated into the future, these recent changes assume a fairly orderly pattern.

In a more practical vein, if planners presume that fertility, mortality and spatial mobility changes during the next ten years or so are likely to be contained within the range of past observations, a mid-term forecast of population redistribution would fall within the range of alternative projections. This is exactly the case of Poland, where low mobility rates seem to have reached a bottom line but are almost certain to continue at that level until the end of the present decade. At the same time, fertility rates are expected to fall back to the late 1970s level over the corresponding period. After 1990, spatial mobility rates are likely to increase again owing to the evolution of the age composition of the population, among other factors. This change will probably contribute to an acceleration of large city growth before the turn of the centuries. Therefore, one can expect the pattern of regional population shares to follow the 1985-based trajectory until the early 1990s, and to tilt towards the 1978-based trajectory afterwards.

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THE AGEING TRANSITION IN AUSTRIA: TRENDS, REGIONAL DIFFERENCES AND SOCIAL IMPACT

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The present study is (1) an attempt to outline the reasons for and the course of the ageing transition in Austria, and (2) to predict what might be the social consequences of this process.

It seems clear that the social outcomes of demographic ageing and increased longevity discussed in this paper represent only a very selective view of societal consequences for the demographic development of the coming decades. The entire complex raises essential questions about one's place in society and meaning of life in the some twenty years between, first, ceasing gainful employment and finally, death (Imhof 1981; Neugarten and Neugarten 1986; Gockenjan and Kondratowitz 1988; Ehmer 1990). Both society as a whole and the individual will be faced with the necessity to answer these questions. Together with other academic disciplines, demography and population geography can share the attempt to answer these questions.

1. "THE AGEING TRANSITION" IN AUSTRIA: CAUSES AND EFFECTS

Austria's population is ageing; that is, the share of the aged in the population is growing. This phenomenon which, borrowing on the term "the demographic transition" is referred to herein "the ageing transition" (Warnes 1982, 8), occurs not only in Austria, but in all industrial nations. If the data of population predictions or mathematical models up to the year 2050 are coupled with the results of past censuses, the ageing process in Austria can be traced for a period of almost 200 years. Within this time period the percentage of those over the age of 60 will have increased fourfold (from 8% to 32%).

Figure 1 indicates the percentage of those over 60 in the population from the year 1869, the year of the first modern census in Austria, up to 2050, the year to which the mathematical model published by the Austrian Statistical Office extends. The curve reveals five distinct segments:

– Until the early 1920s, the number of the elderly in the population was relatively low. Only one of 10 Austrians (1923: 10.1%) was 60 or over.

– In the early 1920s, a trend of the ageing began that continued into the 1970s. During this period, the share of the elderly in the population doubled. By 1971, already every fifth Austrian was over 60.

– Between the years 1970 and 1996, the ageing process results in a constant 20% of those aged 60 or over.

– After the turn of the centuries, Austria can expect a second significant increase in the number of the elderly. Within the first three decades, the share of the elderly will increase from

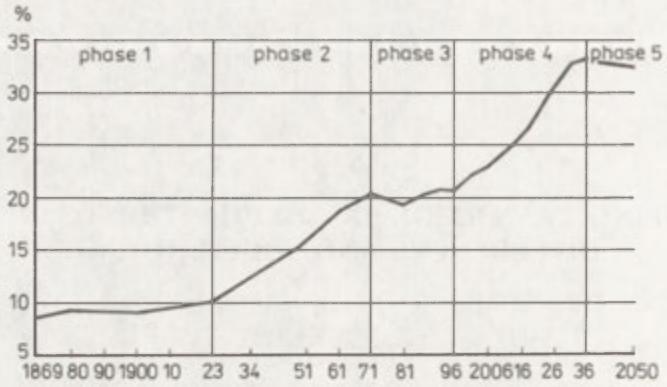

Fig. 1. The "ageing transition" in Austria, 1869 to 2050
(the percentage of population aged 60 or over)
Sources: 1869 to 1951: Census results; 1951 to 1988: Austrian Statistical Office; *Demographische Indikatoren Österreichs*, Wien 1989; 1989 to 2050: Austrian Statistical Office, *Modellrechnungen zur Bevölkerungsentwicklung, Hauptvariante*

20% to 33%. Given this scenario fully, one-third of the Austrian population would be over 60 years of age.

– From the mid-thirties of the next century onwards, there should be no further increase in the percentage of the elderly; the demographic ageing process will have drawn to a close.

The main demographic determinant for the ageing of the population is simple to identify. It was industrialization and modernization that led to decreasing fertility. At the turn of the 19th and 20th centuries, the fertility rate in Austria was 4.0. In a few decades (up to 1935), certainly also as a result of the dire economic situation, the fertility rate sank to 1.6. The decreasing trend was interrupted twice, in the years 1938 to 1940 as a result of the occupation of Austria by Germany, and with the baby boom of the early 1960s. Since the peak of the baby boom, the fertility rate has dropped by one-half, from 2.8 in 1963 to 1.44 in 1989.

From now on, the course of the ageing transition will be affected not only by the rate of fertility but increasingly by the rate of mortality, particularly that of the elderly. This will be especially true for countries where life expectancy is 70 years or more (Myers 1981). Average life expectancy in Austria is now (1989) 72.1 years for males and 78.8 for females. A greater reduction in mortality of the aged than predicted[1] would, of course, increase ageing even more dramatically. The absolute number of the elderly and, especially, that of the extremely old would rise (Guralnik *et al* 1988, p. 301ff.).

2. REGIONAL VARIATION IN THE DEMOGRAPHIC TRANSITION

In the course of the ageing transition in Austria, there have been great regional differences (cf. Fig. 2). These differences are mainly a result of different fertility levels, but also the result of varying migration patterns in the first half of the 20th century. The situation in Vienna is most noticeable, but there are also significant differences in the course of the transition in the eight other Austrian provinces.

[1] The basic version of the population model designed by the Austrian Statistical Office is based on a very conservative predicted rate of mortality. The average life expectancy from birth rises up to 75.0 years for men and 80.9 for women until the year 2015 after which it remains constant to the year 2050.

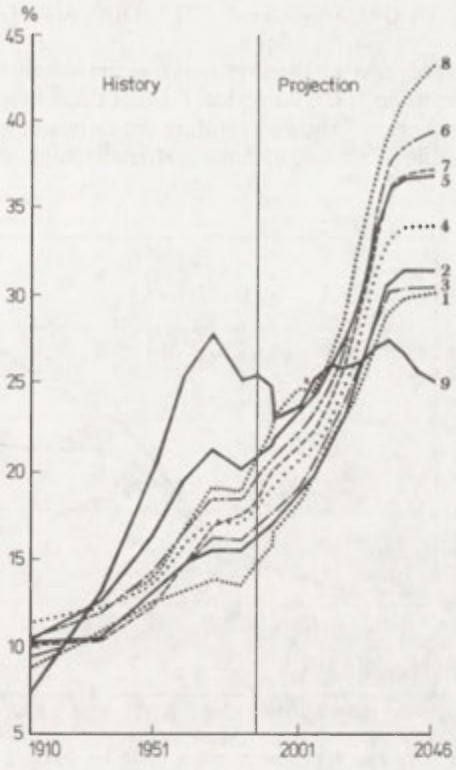

Fig. 2. Regional differences in the course of the "ageing transition", 1910 to 2050 (the percentage of population aged 60 or over)
1 — Vorarlberg, 2 — Tirol, 3 — Salzburg, 4 — Upper Austria, 5 — Carinthia, 6 — Styria, 7 — Lower Austria, 8 — Burgenland, 9 — Vienna
Sources: cf Fig. 1

The ageing trend in Vienna began much earlier than in the other provinces of Austria, and reached a level unparalleled in the world due to reduced immigration and a low birth rate. Between 1910 and 1971, i.e. during only six decades, the percentage of the old in Vienna increased fourfold. Most lokely, this trend will not continue; the development has passed its peak. The percentage of 28% in 1971 will not be reached in Vienna in the coming decades. On the contrary, during only a few decades, Vienna will change from the province with the "oldest" population to the province with the "youngest" population structure (See Fig. 2).

In contrast to Vienna, the other eight Austrian provinces had completely different patterns of the demographic ageing process. Before the census of 1934, there was no sharp increase in the share of the aged anywhere. After that the relative number of the aged increased in all eight provinces, albeit with varying intensity.

The slower pace of the ageing process, beginning in 1970 is apparent in all provinces. This interruption in the ageing process, except for Vienna, lasts only for about one decade. Already at the beginning of the 1980s, a second ageing trend started, which in all eight provinces will be significantly more intensive than the first historical trend which occurred between 1934 and 1971. Moreover, according to the model, this trend will continue into the middle of the 1930s; in Burgenland, the most eastern province of Austria, presumably as long as the middle of the 21st century.

3. SOCIAL CONSEQUENCES OF THE RISE IN THE OLD AGE DEPENDENCY RATIO

Relative to the question of assuring the subsistence of the elderly and the resulting financial burden for the middle generation is the numerical ratio of these two groups of the population in relation to one another. Figure 3 shows the future development of the old age dependency ratio based on three different scenarios: medium, extreme ageing, and extreme immigration.

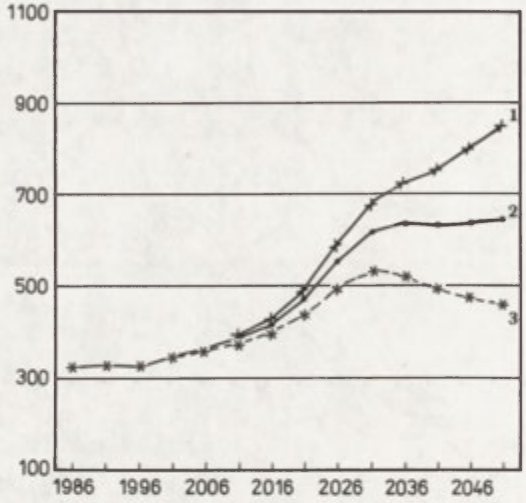

Fig. 3. The old age dependency ratio, 1986 to 2051 (3 scenarios)
1 — extreme ageing, 2 — medium scenario, 3 — extreme immigration
Source: Findl, Holzmann, Münz 1987, p. 71

What is interesting in Fig. 3 is that there is no significant difference between the three scenarios in the rise of the old age dependency ratio until the year 2030. Afterwards the rate remains constant with the medium scenario, continues to rise in the case of extreme ageing and decreases with extreme immigration. In Austria, the shift of the demographic dependency ratios due to the ageing of the population has led to a widespread public debate, in particular in connection with the pension system based on the pay-as-you-go principle. Already today, where there are three employees per one retired, the state has to supplement pension payments with a huge sum of 55 000 000 000 (55 thousand million AS) annually from the working budget. In the year 2025, there will be only two employees per one retired and by the year 2035 this ratio will slow down to 1.6:1 (according to the medium scenario).

In the light of this demographic phenomenon, an attempt is being made to involve employees in private pension programmes based on capital investment, which are thus independent on demographic processes. The legislative basis for these kinds of programmes was laid in 1990. However, it is difficult to say now how many Austrians will become participants of such programmes. In any event, governmental social security will continue to play an important part in providing the subsistence for the aged.

The state health insurance will, of course, face similar financial problems. The older the person, the higher the *per capita* health costs, and as long as the continually decreasing smaller middle generation continues to contribute no more *per capita* to covering medical costs than the ever growing older generation, the problem is plain.

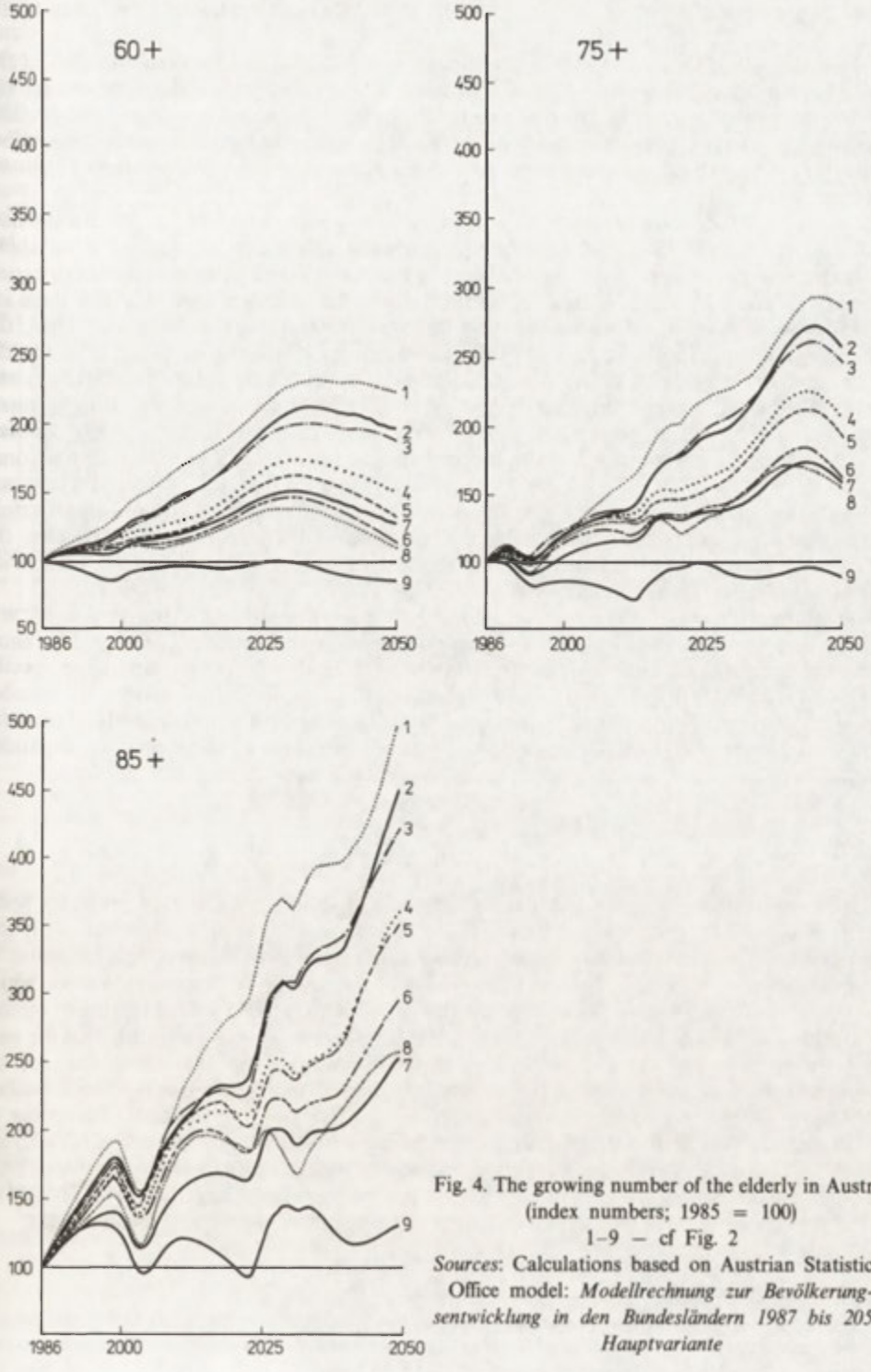

Fig. 4. The growing number of the elderly in Austria
(index numbers; 1985 = 100)
1–9 – cf Fig. 2
Sources: Calculations based on Austrian Statistical Office model: *Modellrechnung zur Bevölkerungsentwicklung in den Bundesländern 1987 bis 2050. Hauptvariante*

4. SOCIAL CONSEQUENCES OF THE RISE IN THE ABSOLUTE NUMBER OF THE AGED

The percentage rise of those over 60 within the population and the resulting shift of the demographic dependency ratios is only one aspect of the demographic development for the coming decades. The growing absolute number of the aged in Austria is at least as important. Two aspects warrant special attention: (1) there will be an overly high increase in the number of the very old (over 75) and the extremely old (over 85), and (2) there will be marked regional differences (Fig. 4).

Once again, the unique status of Vienna in the ageing process stands out. Within the next 50 years the number of the aged will decrease rather than increase. Only among those above 85 an increase can be expected. Conversely, as of the year 2000 all other provinces can expect a rapidly increasing number of the aged, particularly of the extremely aged, whereby there are likely to be substantial differences moving from east to west. In Salzburg and Tirol, the population of those over 60 will double and in Vorarlberg it will rise by fully 130%. On the other hand, in Burgenland, Lower Austria and Styria, it will rise by only 50%. Carinthia and Upper Austria will have values in a middle range. The present east-west situation – many more the aged in the east than in the west – will change markedly in the next few decades.

The differences are even more dramatic for individual provinces if one takes into account those over 75 only, those aged who, seen from the socio-political perspective, warrant particular attention. The number of the 75 year old or over in Vorarlberg will increase fourfold (200%), whereas in Burgenland it will not even double (70%). In the over 85 group, the difference is even greater. In Vorarlberg, the number will increase almost fivefold. Otherwise, except for Vienna, it will at least double.

The large increase in the absolute number of the aged, particularly the very aged, will require great expansion of institutions of medical care and social welfare. The large differences between the provinces, especially as concerns the very aged, will require expanding specific institutions, as needs arise from region to region. For instance, for health services, the number and specialization of physicians, the number of beds in acute care hospitals, and the capacity of nursing homes and hospitals for chronic diseases. In the area of social services, expanded utilities such as meals on wheels, home aid and home nursing care will be needed.

5. THE INCREASING NUMBER OF THE AGED REQUIRING HELP AND CARE

How to nurse and care for sickly older members of society is a question presently being widely and publicly discussed in Austria. It is important to note in conjunction with this debate that at present Austrian social insurance does not provide coverage for those in need of private nursing care. This is due to a legal categorization of illnesses into those which can be "healed" and those chronic degenerative diseases for which medical treatment cannot be expected to provide a cure. The national health-care service covers treatment costs for only the former category of diseases. What this means in reality is that the cost of care for the chronically ill must be borne by the patient him/herself or his/her family. Social welfare institutions of the individual provinces provide help only for the indolent. According to a microcensus[2], there are 110 000 functionally disabled Austrians over the age of 60 who are unable to clothe themselves or move about outside of their places of residence without help. Another 250 000 need some form of help to cope with daily needs. Altogether, some 30% of all older persons in Austria are dependent on aid from others (Kytir and Münz 1989).

[2] Microcensuses in Austria are conducted quarterly by the Austrian Statistical Office and take in random samplings of 1% of all households. In addition to a number of standard questions each census is accompanied by queries on specific topics.

The demographic ageing trend for the following decades means a large increase in the number of elderly in need of outside aid. This predicted growth of the frail elderly is affected only marginally by varying estimates of morbidity (ibid., p. 61 ff.) since, especially for those aged 85 or over, there will be no reduction in the prevalence rate of impairment (Guralnik *et al* 1988, p. 303 ff.).

It cannot be overlooked, however, that the simple quantitative increase in the number of the chronically ill elderly is but one aspect of the complex issue of medical and nursing care for those people. Equally important are questions of who shall be responsible for this care, the welfare state or the family; where should this care take place, in public institutions or at home, and, finally, who should foot the bill: the nation, provinces, communities or family.

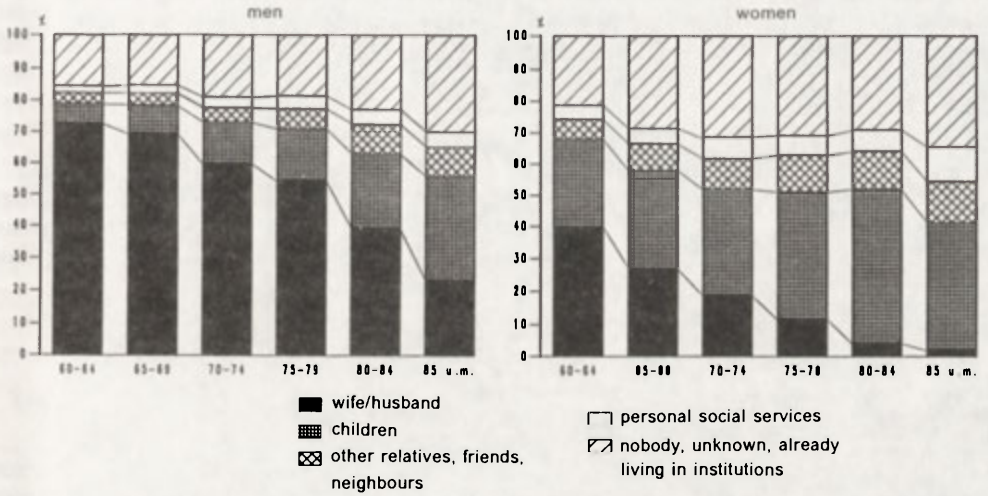

Fig. 5. Who will take care in case of a severe sickness?
Source: Calculations based on the microcensus 1987/2 of the Austrian Statistical Office

Empirical studies indicate that at present about 80% of the responsibility for caring for the sickly elderly is carried by informal social networks. Within these informal social networks, the main burden of care falls on members of the family, most particularly women who, as spouses, daughters or daughters-in-law, care for their parents (Fig. 5). The question whether or not the "post-modern" family in Western societies will still provide such services, is open. Most certainly, caring for the growing number of the aged will represent an ongoing challenge to the Austrian welfare state.

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ANOMALIES IN DEMOGRAPHIC TRANSITION IN POLAND

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Demographic transition in the Polish territories has started only after 1870. It had gradually spread from the western to eastern parts of Poland, and it covered the whole country around 1900. During the initial four decades of the 20th century, a major drop in both fertility and mortality had occurred (Table 1). The total fertility rate (TFR) decreased

TABLE 1. Selected demographic indicators, 1900–1990 (approximate values; selected years)

Year	Crude birth rate	Crude death rate	Rate of natural increase	Crude marriage rate	Infant mortality rate	Total fertility rate	Life expectancy at 0	Per cent below age of 15	Per cent aged 60 or over
1900[a]	44.0	25.5	18.5	8.2	210	6.20	39	39.3	6.3
1910[a]	38.5	22.3	16.2	.	.	5.30	.	.	.
1920[a, b]	32.2	27.0	5.2	10.6	.	4.70	42	35.0	7.1
1930[a]	32.5	15.5	17.0	9.4	143	3.60	49.8	33.6	7.6
1940[a, c]	24.6	13.9	10.7	8.1	140	3.00	54	32.7	7.9
1950	30.7	11.6	19.1	8.1	111.2	3.71	61.5	29.4	8.2
1960	22.6	7.6	15.0	8.2	54.8	2.98	67.8	33.5	9.4
1970	16.6	8.1	8.5	8.5	33.4	2.20	70.1	27.0	12.8
1980	19.5	9.9	9.6	8.6	21.3	2.28	70.5	24.3	13.2
1990[d]	15.0	10.0	5.0	.	17.5	2.10	71.0	25.2	14.8

[a]Around a given year,
[b]The Polish-Soviet war took place in 1919–1920,
[c]1938,
[d]Projected values (UN-1989-medium variant).
Source: Central Statistical Office (own estimates).

by more than one half and life expectancy at birth (e_0^0) increased by some 40%. The ageing of population began. In the 1930s, the rate of natural increase started to slow down what marked the final phase of demographic transition in Poland. Changes related to the second world war, including considerable changes in the national boundaries, resulted in important perturbations in the course of demographic transition. Nevertheless, although shortly after the war the fertility and natural increase rose to the levels observed as long ago as in the beginning of the present century, the demographic transition continued. Finally, at the end of the 1980s, the TFR dropped below the replacement level, e_0^0 started to exceed 70 years, the rate of natural increase approached the zero growth level and the share of the old-age (60 years or over)

population reached the relatively high level of one seventh. All these suggested the termination of demographic transition in Poland.[1]

As was mentioned, the demographic transition in Poland was by no means a smooth and undirectional process. On the contrary, it abounded with sudden and significant shifts, jerks or pauses. Comparing with the typical European course, its overall view displayed various deformations and anomalies (Okolski 1990a).

The main scope of this paper is to describe the deformations which were observed after 1945, and particularly during the recent 20 years. The "normal" course of demographic transition is perceived here as a composition of durable, relatively smooth and irreversible processes, like: deep decline in fertility and mortality (and increasing life expectancy), the emergence of a new age patterns of fertility and mortality, substantially different from pretransitional, specific changes in the structure of deaths by cause and, ultimately, the ageing of population. In the final phase of the demographic transition, the natural increase, which rises steeply in its incipient phase, slows down and regional or urban-rural disparities in population phenomena are being levelled off. It might be mentioned that these processes are, as a rule, accompanied by large-scale rural to urban migration, distinct changes in birth control practice, the decline in the rate and incidence of marriages, the increase in the divorce rate, and the incidence of informal unions and extramarital births, radical improvement in health, etc. (Okolski 1990b).

The principal processes which consist in population reproduction were in accordance with the above specified "model" tendencies only between 1955 and 1970, and after 1985. From the viewpoint of a set of those tendencies, two sub-periods might be distinguished in which deformations of demographic transition in Poland were particularly visible. Their approximate time limits were: 1945–1955 and 1970–1985.

It seems that the following phenomena are characteristic of the first sub-period (1945–1955; Rosset 1975).

1. The large number and rate (some twice as high as usual) of newly contracted marriages which constituted a compensation after six years of voluntary or involuntary war abstentions.

2. An outburst of fertility, especially in the regained north-western territories, which resulted from the increased marriage rates, autonomous compensatory wave of births which were avoided (voluntarily or not) during the war and the relatively favourable socio-economic circumstances connected with the settlement of the regained areas by young people (otherwise faced with much poorer living prospects). The peak was reached in 1951–1953 when the crude birth rate exveeded 30 per thousand and TFR was fairly close to 4.

3. A sharp decline in mortality, particularly around and after 1950, mostly due to the eradication of many common infectious diseases. This mostly stemmed from the state designed and financed prophylactic activity.

4. Explosive natural increase whose rate in the early 1950s touched the limit of 20 per thousand, the highest level ever recorded in Poland. Due to the high fertility, decreasing mortality and temporary "juvenilization" of the population age structure, the high rate of natural increase persisted until the early 1960s.

5. Intensive migration flows and enormously large contribution of net migration to the growth (positive or negative) in total urban and rural populations as well as populations of particular localities.

It is easy to notice that those phenomena were directly related to the Second World War which produced a clear discontinuity of population processes with the past. To illustrate the magnitude of changes generated by the events of the war, it seems enough to remind that the number of residents of Poland in February 1946 who lived within the 1939 Polish boundaries or were born to them between 1939 and 1945 was around 20 000 000 while

[1] On demographic transition in Poland in the period prior to the First World War see e.g. S. Borowski (1970). The interwar period is well described in S. Szulc (1936, 1939) and S. Borowski (1974).

the expected size of Poland in 1946 in absence of the war would had been slightly less than 38 000 000. No wonder, therefore, that a shortage of 18 000 000 inhabitants, or 47% of the expected 1946 figure – not to mention structural demographic consequences of the war – must have had a tremendous influence on the demographic processes directly after 1945.[2]

By the end of the 1950s, however, most of demographic processes of extraordinary source and nature seemed to be already gone. Indeed, at the beginning of the 1960s, the fertility rates decreased steadily, mortality decline slowed down and natural increase started to stabilize. Also differences between populations of various regions and between urban and rural populations grew not very high. Those tendencies, however, did not continue for a long time.

The stabilization of the rate of natural increase was obviously premature. For more than 20 years (1964–1984), the rate oscillated around the level of 10 per thousand which was the bound to bring about doubling of population size in 70 years. Meanwhile, the level typically expected for the stabilization of natural increase would be close to the zero growth.

It also turned out soon that the dying out of fertility and mortality decline was not necessarily a symptom of the "normalization" of the demographic transition in Poland but rather of a new deformation. In the late 1960s, the TFR stabilized briefly while some age-specific death rates started to rise. It was not ephemeral. On the contrary, since the early 1970s, a limited but consistent increase in overall and age-specific fertility and mortality has been occurring in Poland (Okolski 1983b).

A more thorough examination of the population trends in the second "deformed" sub-period (1970–1985) reveals many more anomalies than in the immediate postwar years. They could have been observed on the national level, in some regions of the country as well as from the point of view of urban-rural differentials and interregional differences.

On the national level, deteriorating health was a striking phenomenon which particularly referred to working-age men. Within that group, the death rates increased by some 30–60% between the middle of the 1960s and the 1980s (Table 2). Some cause-specific death

TABLE 2. Increase in the age-specific death rates of adult males between 1965/66 and 1985/86 (per cent)

Age	Increase	Age	Increase
30–34	10.0	60–64	21.8
35–39	29.4	65–69	7.1
40–44	40.3	70–74	6.5
45–49	58.9	75–79	9.5
50–54	49.8	80–84	11.7
55–59	37.5	85 or over	14.3

Source: Central Statistical Office (Demographic Yearbooks).

rates, especially related to cardiovascular diseases and accidents, more than doubled in that period. Over time, the increase in mortality covered more and more groups of the adult population, both male and female. Male life expectancy at birth decreased between 1974/75 and 1984/85 by 0.7 year while the respective female figure almost stagnated. Male life expectancy at the age of 30 decreased by 1.3 and at the age of 45 by 1.0 year in that period (Table 3; Okolski 1989a). Compared with all the other countries in the world, this was a unique feature of Poland and some other countries of Eastern Europe. Infant mortality rate continues to be relatively high and increasingly lags behind the European average. Early neonatal mortality (the first week of life) is twice as high as the total infant mortality (the

[2] This is my own estimate based on and coherent with the calculations carried out by K. Piesowicz (1988).

whole first year of life) in most of the countries of Northern and Western Europe. Since the mid-1960s, the share of low-weight births with high death risk has gradually risen to reach a very high level of 9.2% of all live births in 1987 (Table 4).

TABLE 3. Life expectancy of females (e^F) and males (e^M) at selected ages (0, 30 and 45), 1970–1988

Year	e^F_0	Males		
		e^M_0	e^M_{30}	e^M_{45}
1970/71	72.9	66.0	40.6	27.3
1972/73	74.0	66.8	40.7	27.3
1974/75	74.3	67.0	40.7	27.4
1976/77	74.3	66.4	40.6	27.3
1978/79	74.5	66.2	40.4	27.2
1980/81	74.6	66.3	40.1	26.9
1982/83	74.9	66.8	40.2	26.9
1984/85	74.6	66.3	39.4	26.3
1986/87	75.3	66.8	39.5	26.2
1988	75.7	67.1	39.6	26.4

Source: Central Statistical Office (own estimates) and M. Kędelski (1989).

TABLE 4. Infant mortality rate and percentage of low-weight births, 1970–1987 (selected years)*

Year	Infant mortality rate		Percentage of low-weight live births**
	total	early neonatal (0–6 days)	
1970	36.7	17.6	6.5
1975	29.2	16.3	7.6
1980	25.6	14.7	8.1
1985	22.0	14.0	9.1
1987	21.1	13.7	9.2

*Adjusted, i.e. based on the WHO definition of live birth,
**Below 2500 g.
Source: Central Statistical Office (own estimates).

The other conspicuous tendency was strengthening of the family as a functional unit organized on the basis of economic and social interests and activities rather than emotion. Marriage rates increased in the first half of the 1970s and remained rather high until the early 1980s. On the other hand, the rate of divorce did not change before 1982 and even since that year has been exceptionally low as compared with most European countries (Table 5).

Despite the reported widespread disintegration of family life, marriage is relatively stable and other forms of sexual partnership are rare (Adamski 1982; Jarosz 1982). About 95% of the children are born within formal unions and this percentage does not significantly change over time (with a minor exception in 1985–1987) in spite of the profound alternation in the living standard, consumption pattern and cultural milieu (Table 5). Within marital unions,

TABLE 5. Crude marriage and divorce rates and percentage of illegitimate births, 1970–1988

Year	Marriage rate	Divorce rate	Illegitimate births
1970	8.5	1.1	5.0
1971	8.9	1.1	4.9
1972	9.3	1.1	4.9
1973	9.4	1.2	4.7
1974	9.5	1.2	4.8
1975	9.7	1.2	4.7
1976	9.5	1.1	4.8
1977	9.4	1.2	4.9
1978	9.3	1.0	4.7
1979	9.0	1.1	4.7
1980	8.6	1.1	4.7
1981	9.0	1.1	4.6
1982	8.7	1.3	4.6
1983	8.4	1.3	4.6
1984	7.7	1.4	4.7
1985	7.2	1.3	5.0
1986	6.9	1.4	5.1
1987	6.7	1.3	5.4

Source: Central Statistical Office (Demographic Yearbooks).

there prevail rather primitive techniques of contraception. Even in 1981, 83% of young couples practising contraception (14% of all marriages did not use any method) resorted to either withdrawal or calendar rhythm or condom or a combination of those techniques. That meant that a vast majority relied on a highly deceptive method (Table 6; Okólski 1983a).

The outcome of such contraceptive patterns, among other things, is, on the one hand, the high incidence of abortion. According to one of the very few reliable estimates, every second

TABLE 6. Contraception among married couples[a] in 1981

Contraception status	Frequency
Total absolute number of couples of which; non--users	7722 1077
(percentage of non-users)	(13.9)
Total absolute number of users of which per cent of using:	6645
1. Withdrawal	36.8
2. Calendar rhythm alone or combined with withdrawal	33.2
3. Condom alone or combined with withdrawal or calendar rhythm	13.1
4. IUD (loop)	6.0
5. Pill	5.9
6. Temperature rhythm	2.5
7. Other method	2.4

[a]Based on 5% national sample of marriages contracted in 1975 by a woman below 30 years of age.

Source: Central Statistical Office (own estimate).

pregnancy in 1977 was terminated in induced abortion. Recent model calculations reveal that the present fertility would have been higher by 75% in the absence of abortion (e.g. in France by 3%) or by 108% in the absence of contraception (e.g. in France by 210%). On the other hand, a wide use of primitive techniques of contraception contributed to a relatively high fertility (Iglicka 1989).

Overall fertility started to rise in 1971, and in 1983 the TFR exceeded 2.4, 10% more than in 1970 (Fig. 1) and 50% more than the West European average in 1983 which since the

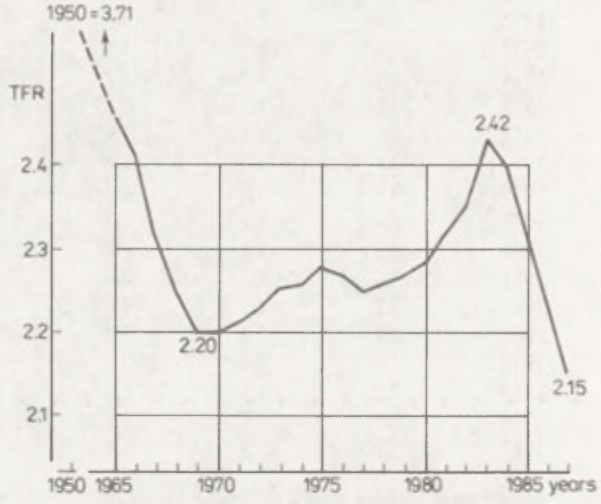

Fig. 1. Total fertility rate, 1965–1987
Source: CSO Demographic Yearbooks (various years)

beginning of the 1960s has declined rapidly and uninterruptedly. One might even have observed a gradual acceleration in the TFR increase between 1977 and 1983. The fastest pace occurred precisely nine to ten months after 13 December, 1981 when martial law was introduced. Although an increasing fertility was a national phenomenon extended to all social groups, those who contributed the most to it were women in their twenties (Fig. 2; Okolski 1989b).

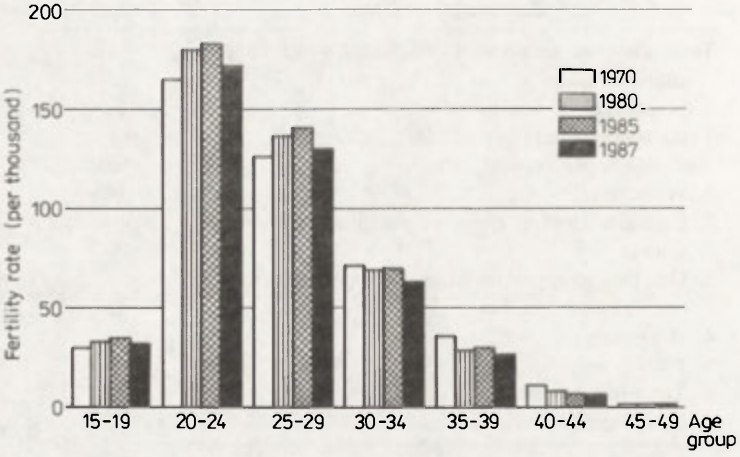

Fig. 2. Age-specific fertility rates, 1970–1987 (selected years)
Source: CSO Demographic Yearbook, 1988

The increase in the TFR was faster in urban than in rural areas. In the former, it was almost a continous process while in the latter two peaks were noted of which the 1976 peak

TABLE 7. Urban and rural total fertility rates (TFR), 1970–1988

Year	TFR		Absolute difference (R–U)
	Urban (U)	Rural (R)	
1970	1.71	2.89	1.18
1971	1.75	2.98	1.23
1972	1.74	2.98	1.24
1973	1.72	3.10	1.38
1974	1.74	3.12	1.38
1975	1.77	3.18	1.41
1976	1.84	3.20	1.36
1977	1.80	3.09	1.29
1978	1.80	3.04	1.24
1979	1.93	2.89	0.96
1980	1.93	2.91	0.98
1981	1.91	2.83	0.92
1982	1.97	3.02	1.05
1983	2.14	2.91	0.77
1984	2.10	2.85	0.75
1985	2.05	2.82	0.77
1986	1.94	2.70	0.76
1987	1.87	2.63	0.76
1988			

Source: Central Statistical Office (Demographic Yearbooks).

was much higher than the 1982 peak. The increase in towns amounted to 25% in the whole period of growth (1971–1983) while in rural areas the total increase in that period was negligible. However, in the latter case the TFR went up by 11% between 1971 and 1976 (Okólski 1989b).

Such uneven changes in fertility in urban and rural areas produced a surprising effect of the expanding gap between the respective TFRs in 1971–1975. The difference observed in 1975 was of the remarkable magnitude of 1.5 children. A steep decline in rural women fertility in the 1976–1981 period, coinciding with further rise in towns, produced the narrowing of a gap to a few more than one half of the 1975 value. One had to wait until 1983 for this to happen though (Table 7).[3]

There are many other distinct differences between demographic phenomena in urban and rural areas in Poland. A synthetic picture reflecting some of them is presented as the respective 1987 age pyramids (Fig. 3). Four features of those pyramids seem worth mentioning:

– the shape and size of their upper segment (the age of 65 or over) are strikingly similar which results from the relatively limited participation of the old people in the past rural to urban migration and similar levels of mortality;

– the size of the remaining part of the pyramid is much larger in towns than in rural areas; the difference is particularly distinct for the 5–15 age group, and this mostly reflects the great increases in urban fertility in 1970–1983 and for the age of 25 to 60, the fact which, in turn, constitutes the result of past internal migrations;

[3] On the other aspects of fertility differentiation see e.g. J.Z. Holzer and K. Link, eds, 1988.

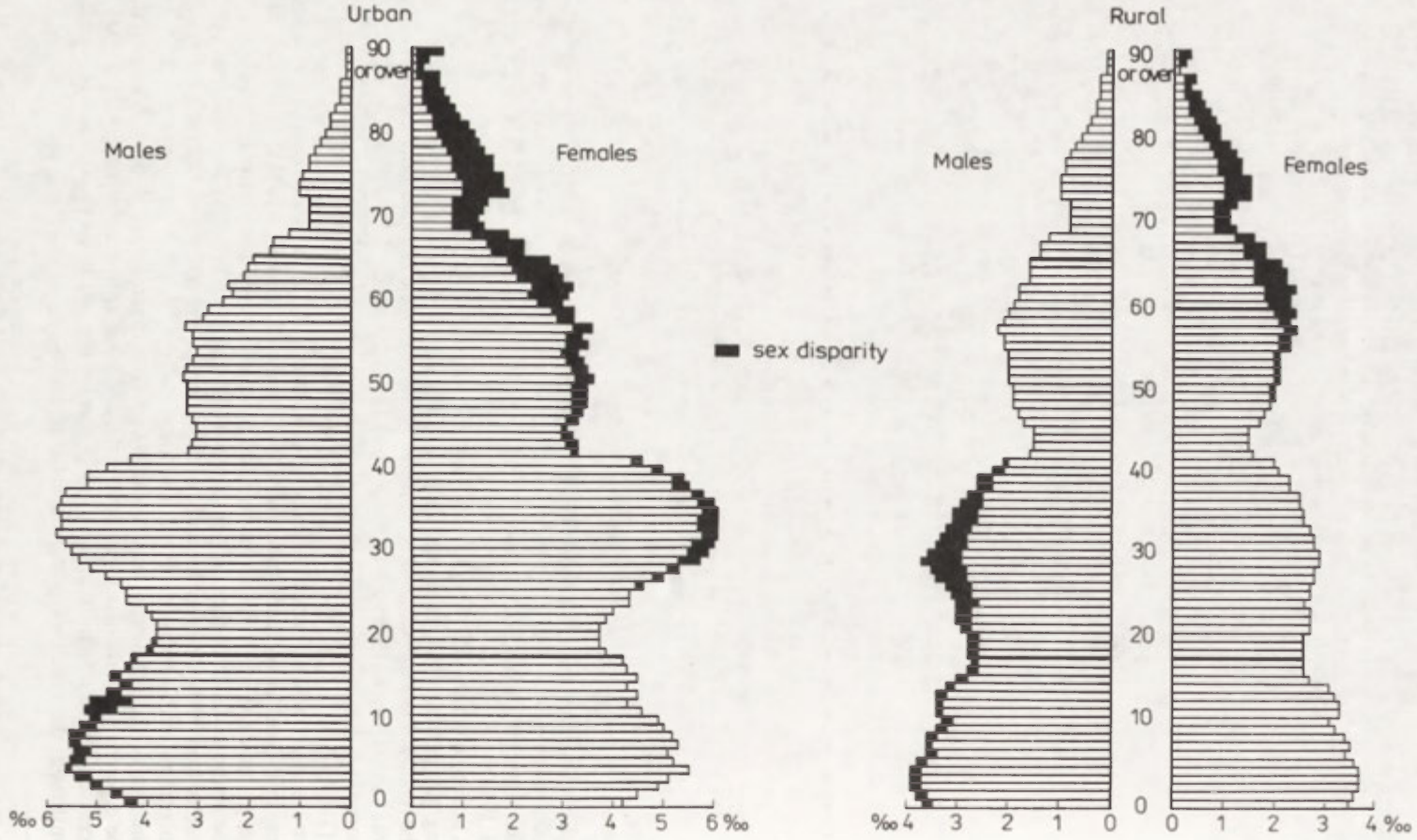

Fig. 3. Population by sex and age, Poland, 31 Dec. 1987
Source: CSO Demographic Yearbook 1988

TABLE 8. TFR in five voivodships with the highest and lowest fertility, 1960–1987 (selected years)

Rank[a]	1960	1970	1980	1987
National average	3.03	2.20	2.28	2.15
Highest	4.04[b]	3.14[b]	3.03[b]	2.69[b]
1	4.21 (Łomża)	3.35 (Łomża)	3.19 (Nowy Sącz)	2.76 (Biała Podl.)
2	4.16 (Suwałki)	3.24 (Nowy Sącz)	3.12 (Łomża)	2.76 (Łomża)
3	3.97 (Piła)	3.11 (Ostrołęka)	2.97 (Tarnów)	2.70 (Nowy Sącz)
4	3.94 (Słupsk)	3.02 (Tarnów)	2.95 (Biała Podl.)	2.65 (Przemyśl)
5	3.90 (Ciechanów)	2.98 (Rzeszów)	2.94 (Ostrołęka)	2.58 (Siedlce)
Lowest	2.28[b]	1.68[b]	1.84[b]	1.81[b]
1	1.76 (Warsaw)	1.42 (Łódź)	1.62 (Łódź)	1.58 (Łódź)
2	1.89 (Łódź)	1.53 (Warsaw)	1.66 (Warsaw)	1.63 (Warsaw)
3	2.47 (Cracow)	1.68 (Poznań)	1.91 (Wrocław)	1.92 (Wrocław)
4	2.49 (Katowice)	1.85 (Wrocław)	1.96 (Cracow)	1.96 (Wałbrzych)
5	2.77 (Wrocław)	1.93 (Wałbrzych)	2.05 (Katowice)	1.97 (Katowice)

[a]Total number of voivodships is 49 (according to the administrative breakdown since 1976; data for earlier years adjusted and comparable).
[b]Unweighted average of five respective values.
Source: H. Bogacka *et al.* (1988).

TABLE 9. Life expectancy in five voivodships with the lowest and highest mortality, 1981–1985 (annual average)

Rank[a]	Males		Females	
	e_0	e_{45}	e_0	e_{45}
National average	66.91	26.66	75.06	32.85
Lowest	65.55[b]	25.45[b]	74.02[b]	32.01[b]
1	65.35 (Wałbrzych)	25.34 (Wałbrzych)	73.85 (Katowice)	31.70 (Katowice)
2	65.52 (Jelenia Góra)	25.36 (Elbląg)	73.90 (Łódź)	31.94 (Jelenia Góra)
3	65.56 (Łódź)	25.47 (Katowice)	74.01 (Jelenia Góra)	32.06 (Łódź)
4	65.57 (Szczecin)	25.51 (Jelenia Góra)	74.15 (Wałbrzych)	32.08 (Szczecin)
5	65.75 (Elbląg)	25.56 (Łódź)	74.18 (Szczecin)	32.25 (Szczecin)
Highest	68.44[b]	28.20[b]	76.22[b]	34.06[b]
1	69.11 (Białystok)	29.11 (Białystok)	76.85 (Białystok)	34.66 (Białystok)
2	68.53 (Rzeszów)	28.27 (Łomża)	76.21 (Zamość)	34.44 (Łomża)
3	68.26 (Tarnobrzeg)	27.97 (Biała P.)	76.08 (Łomża)	33.90 (Suwałki)
4	68.14 (Krosno)	27.89 (Tarnobrzeg)	76.02 (Rzeszów)	33.67 (Tarnobrzeg)
5	68.04 (Łomża)	27.77 (Suwałki)	75.94 (Suwałki)	33.65 (Zamość)

[a]Total number of voivodships is 49.
[b]Unweighted average of five respective values.
Source: *Trwanie życia*... 1986.

– the excess of females over males is much greater in towns; between the age of 25 to 40 in rural areas, there is a distinct excess in the number of males (not to mention a shortage of females), as opposed to towns where females dominate; those differences result from sex-selective nature of the urban to rural migration;

– the shape of the bottom and middle segments of the pyramids is to some extent similar and different; the similarity stems from the war losses while the difference is the result of the natural and migratory movements.[4]

Two major forces of population reproduction – fertility and mortality – are still strongly differentiated over Poland. The regional pattern is rather clear; the eastern voivodships have, as a rule, higher fertility and lower mortality while the northern and western voivodships (including centrally located Warsaw and Łódź) have lower fertility and higher mortality.

Although the interregional differences in fertility are rather substantial, they tend to

Fig. 4. Areas of ecological disaster, 1988.
1 – urban agglomerations, 2 – areas of ecological disaster
Sources: Rządowa Komisja Ludnościowa, Raport 1988; *Sytuacja demograficzna Polski*, Warszawa 1988.

[4]For a more detailed description of the causes and consequences of changes in the age composition see E. Frątczak et al. (1987).

diminish over time. This is due to the gradual disappearance of voivodships with high fertility (in 1970, four units had the TFR higher than 3.0, two in 1980 and none in 1987) and a slight increase of the TFR in the least fertile voivodships (Table 8).

The territorial disparities in mortality do not wane. This is due to the accelerated increase in death rates in the already "handicapped" western regions, and has much in common with the industrial and agricultural development, as reflected in the indicators of the conditions of the natural environment and current environmental pollution (Fig. 4; *Sytuacja demograficzna...* 1989; Okólski 1990c).

Such a conclusion is somewhat surprising, as in most of industrialized countries the negative health effects of pollution are being successfully offset by higher living standards (including better health care). The resultant difference between the regional life expectancy at birth, observed in the beginning of the 1980s, equalled three years in the case of females and was close to four years in the case of males (Table 9). Estimating on the base of the past Polish experience and provided favourable circumstances, it would eventually take at least 15 years to the highest mortality voivodships to reach the life expectancy encountered in the voivodships with the lowest mortality.

The regional differences in demographic processes are even more acute on the level of the agglomeration, city or commune. Some Polish authors have recently indicated the emergence of regions threatened with demographic disaster, i.e. an inability to the normal reproduction of their population size and structures (Jelonek 1986).

The deformations of demographic transition in Poland during the recent 20 years or so pertain to three major areas: health, family and residence. In all those areas, there are symptoms of a multidimensional structural crisis. The demographic processes are one side of it. The demographic deformations tend to persist or even strengthen. By no means are they plausible exceptions in the typical European course of demographic transition (Okólski 1990c).

There is no simple explanation for the nature of those deformations. Definitely, they could not be related to a single cause like the war. One observation, however, seems justified. The anomalies of demographic transition which were revealed at the end of the 1960s, must have sprung up for a number of years and they do not constitute autonomous or stray social phenomena. Their very existence and, in some cases, intensity cannot be separated from the introduction and, ultimately, disruption of the communist system and its values, the social and political relations and the quality of life the system brought about in Poland.[5]

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[5] A comprehensive description of this question is presented in M. Okólski – Przemiany ludnościowe w Polsce w XX w., in.: *Encyklopedia Kultury Polskiej XX w.*, Uniwersytet Wrocławski, Wrocław (under preparation).

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SUDDEN CHANGES IN DEMOGRAPHIC PROCESSES: TWO APPLICATIONS OF CATASTROPHE THEORY

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1. INTRODUCTION

The course and effects of evolutionary process depend on the susceptibility of a system to change. This refers both to natural and social systems. In the case of social systems, many obstacles may reduce their susceptibility to change, e.g. conservative social institutions, low motivation to work, low innovation qualities, stagnant organizational structure.

If the acceleration of growth in a system is considered, it is advisible to prove whether its past development shows a tendency to sudden changes. Depending on the results obtained, one can define necessary corrections of the system's mechanism. The examination of susceptibility to sudden change is particularly appropriate in the case of spatial systems, whose structures are considered to be inert.

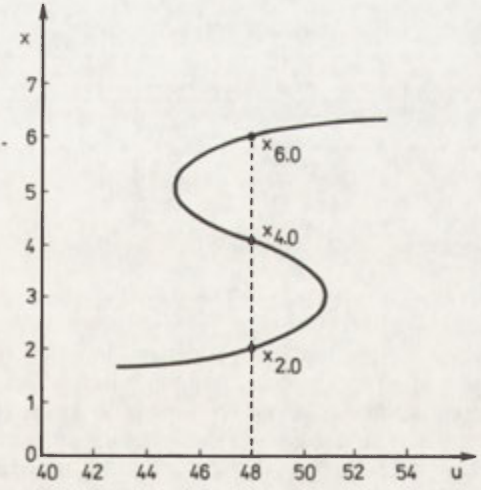

Fig. 1. A computer generated sudden change
x – state variable, u – control variable

In proving the susceptibility to sudden change, one can use the bifurcation and catastrophe theory (Fig. 1). Its foundations and possible applications in geography and regional science were extensively examined by Wilson (1981). Although empirical applications have spread, it is advisable to continue experiments in order to explore the potential of the theory, and to make it more operational.

If some systems are inclined to develop rapidly in a negative direction, policies may be proposed to hamper or reverse this process, if, however, they show an inclination in positive direction, policies favouring natural tendencies may be suggested.

Below, an account of two experiments is presented. Rural to urban out migration in Poland, and the state of small cities in the shadow of a large city in West-Central Poland (the Poznań region) are examined with regard to their susceptibility to sudden change. Both systems are crucial for spatial development of regions. It is, therefore, purposeful to learn what is their susceptibility to change and, consequently, to control.

2. METHODOLOGY OFFERED BY CATASTROPHE THEORY

Most mathematical models represent the state of urban and regional systems as a point which is a function of certain parameters (independent variables). When these parameters change slowly and smoothly, so does the values (locations) of equilibrium points. On the other hand, the catastrophe theory[1] deals with the sudden and discontinuous changes in the state of systems resulting from slow, smooth and small changes of one or more parameters. This theory was initiated by Rene Thom (1972). It is based on a branch of mathematics called differential topology.

The catastrophe theory is usually joined with the bifurcation theory. The latter is more general, as it refers to a wider class of systems. However, in the early stage of applications, more examples were presented within the catastrophe theory and its name became more popular. A narrower range of the applicability of catastrophe theory results from the fact that it describes the so-called gradient systems minimizing a certain objective function and dynamics connected with it (or maximizing its reverse). For instance, let $\underline{x}$ be a set of state variables which describe a certain system, and let $\underline{u}$ be a set of parameters which are control variables. Then, in a gradient system, the equilibrium position is defined by

$$\underset{(\underline{x},\ \underline{u})}{\text{Min}} = f(\underline{x},\ \underline{u}) \tag{1}$$

for a certain function f. Dynamics of the process is described by an expression

$$\dot{\underline{x}} = -\frac{\partial f}{\partial \underline{x}} = -\operatorname{grad} \underline{f} \tag{2}$$

and minimum f occurs then

$$\operatorname{grad} \underline{f} = 0 \tag{3}$$

The occurrence of gradients of function f explains the name of systems of this type.

The solution of equation (3) gives the point of equilibrium which minimizes the function (1), and when $\underline{u}$ is changing it creates a certain surface in space $(\underline{x}, \underline{u})$. This is a surface representing the possible states of equilibrium of the system. For instance, if there is one state variable (x_1) and two control variables (u_1, u_2), there will be a surface in the three-dimensional space (x_1, u_1, u_2).

When small and smooth changes in variable $\underline{u}$ correspond to small and smooth changes in variable $\underline{x}$, the surface $(\underline{x}, \underline{u})$ is also smoothed, i.e. unfolded. If, however, for a given $\underline{u}$ there are multiple solutions for $\underline{x}$, the result is different, more complicated. The essence of Thom's work consists in the classification of these complications and proving that the multitude of specific cases may be grasped in several main types.

[1] This chapter is based on Wilson's work (1981, chapter 1).

The solutions of equations (1) or (3), respectively, are stationary points of function f or, more precisely, the family of function $\underline{x}$ parametrized by $\underline{u}$. Stationary points are often the maxima or minima and, in case of one state variable, the second derivative of f is either negative or positive, respectively. When stationary points are neither maxime nor minima, the second derivative equals to zero or when state variables and parameters of the system are matrices, the Hess matrix is an unit matrix. Such points of equilibrium are known as singular, and just in these points or close to them the system behaves peculiarly. What Thom and his continuators did, consists in the classification of singularities which may occur. At the same time, it was shown that when the number of control variables $\underline{u}$ is smaller than or equal to 4, there are only a few types of singularities. For instance, when the system is described by one state variable and two control variables, the surface of equilibrium points around the point of singularity must be topologically equivalent to the known cusp surface. This is illustrated in Fig. 2.

By means of this figure, the possibilities of the catastrophe theory may be illustrated. The surface of the values of equilibrium describes all the possible states of the system. And the specific behaviours of the system are projected by its trajectory on this surface. The study of such surfaces for various systems makes one possible to trace the possible types of behaviours. Thom's theorem may be used for the limitation of these possibilities, since it shows that the surface in a topological sense must assume a form as in Fig. 2. The exemplary trajectories drafted in this figure illustrate three types of behaviour of the system whose occurrence has been traced relatively seldom. These are: (1) a sudden jump or the so-called catastrophe, (2) hysteresis, i.e. a different run of a certain point in the return way than that in the initial way, (3) divergence, i.e. a situation in which a small difference in approaching the cusp point leads the system to either the upper or the lower surface, thus to a different state.

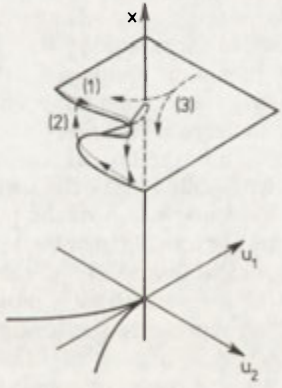

Fig. 2. The cusp surface (Wilson 1981, p. 4)

It is esay to notice that a sudden jump results from the fact that the system in its path of motion in space $\underline{u}$ looks as if it falls from the upper to lower surface (or conversely), omitting the fold. Such a jump is possible because in a certain region of space $\underline{u}$ there are many solutions of the equilibrium for $\underline{x}$. In the case considered in Fig. 2, in its central part, there occur three possible solutions for $\underline{x}$. The upper and lower surfaces represent the stable minima whereas the central part of the fold represents the maxima, i.e. unstable states. If this fold region is projected vertically downward onto the $\underline{u}$ space, one obtains the known cusp part of the space (Fig. 3). This part includes the set of values $\underline{u}$ which are critical in a sense. Outside the dashed region, the system has only one available state. And in its inside two states, i.e. conflict situations, are possible. When the system goes beyond the boundaries of the critical region, its jump is possible.

The main idea resulting from catastrophe theory is therefore that the observation of the singular, unusual behaviours of the systems may be interesting. At the same time, it offers adequate techniques useful in modelling such behaviours.

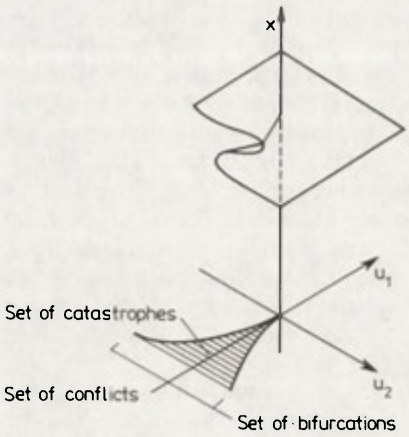

Fig. 3. The sets of catastrophes, bifurcations and conflicts (Wilson 1981, p. 21)

Various possible types of the behaviour of systems ($\underline{x}$, $\underline{u}$) may be usefully classified, concentrating one's attention on variables by means of which one can influence those systems, i.e. on the control variables. The set of controls is the small-dimensional space $\underline{u}$. Let us consider, in the set of controls $\underline{u}$, an appropriate point or points in the set of behaviours ($\underline{x}$, $\underline{u}$). Then one can identify regions of controllable behaviours. It has already been stated that when the values of control variables generate only one state of equilibrium, the behaviour of the system is easy to determine. Let us notice, however, that there is a region in which there are more than one solution. It is a set which is called a set of catastrophes. However, it is not at once clear what state will be assumed by the system. Additional information is indispensable for it. The two sets mentioned above, i.e. the set of univocal solutions and the set of catastrophes, are separates by a set called the bifurcation set. This is a critical set of points in which the minimum disappears. It occurs in such points in which the system, if it is in a state in which the minimum disappears, must make a jump to another state, i.e. its state must be branched, undergo bifurcation (hence the term bifurcation set). This is illustrated in Fig. 3.

The behaviour of the system corresponding to the control points in the catastrophe set is defined by the so-called delay convention. This is a rule which must be defined so that it is possible to determine which of the possible positions will be assumed by the system. Two possibilities are the most frequent: (1) perfect delay, that means that the system remains in the initial state which disappears if the trajectory leaves the bifurcation set; (2) Maxwell convention which assumes that if more than one minimum is possible, the system will select the state which represents the lowest minimum.

Both rules are manifested in different behaviours of the systems and the differences are important when one comes to applications of the theory. In case of a perfect delay, the jump occurs when the trajectory crosses the bifurcation line. In the case of Maxwell convention, what is a significant region is the so-called set of conflicts, defined as points in the control set in which two or more minima have equal values.

The behaviour of systems with a perfect delay may be connected with the idea of thresholds which the system must cross before a change is performed, e.g. an urban system before a change in its hierarchic position. In the case of the Maxwell convention, the set of conflicts is conceived as a moving wave which was used by Thom as a base of the considerations of morphogenesis. The latter case appears particularly important when the control variables represent time and space simultaneously, i.e. when the system is defined by three spatial dimensions and one temporal dimension.

In the modelling of the development of spatio-economic systems, one usually considers two simplest types of catastrophes: the fold catastrophe and the cusp catastrophe. The mathematical description of the fold catastrophe is as follows. The fold is the universal unfolding of the singularities x^3 and can be described by function

$$z = \frac{1}{3}x^3 + ux \tag{4}$$

for one variable x and one control variable u. This is a canonical form of the family of function $f(x, u)$. The possible states of equilibrium of the system described in this way occur if $z = z_{\min}$, which one can find setting the derivative to zero:

$$\frac{dz}{dx} = x^2 + u = 0 \tag{5}$$

The solution of this equation is

$$x = \pm(-u)^{\frac{1}{2}} \tag{6}$$

Let us notice that the second derivative is

$$\frac{d^2z}{dx^2} = 2x \tag{7}$$

Since it is positive for positive values x and negative for negative values, the minima of functions occur for positive values, and maxima for negative values. The equation (6) also shows that the real roots exist only for negative u.

In this type of catastrophes, the bifurcation set is very simple. It is only an initial point of coordinates (x, u) since it is only here that minimum disappears. In this point one can observe the jump behaviour: if the system is in a state defined by negative u and on the trajectory in which u is increasing, if u passes through zero, the state of equilibrium with the stable minimum disappears and the system has to take up another state.

The cusp catastrophe is the universal unfolding of the singularities x^4 and can be described by the function

$$z = \frac{1}{4}x^4 + \frac{1}{2}u_1x^2 + u_2x \tag{8}$$

This is a canonical form of the family of function $f(x, u_1, u_2)$. Thus, for the generation of the full family of those functions, two parameters are needed. The stationary values z may be found by setting its derivative to zero:

$$\frac{dz}{dx} = x^3 + u_1x + u_2 = 0 \tag{9}$$

Such an equation has one or three real roots. The condition for the existence of three roots is

$$\left(-\frac{1}{3}u_1\right)^3 > \left(\frac{1}{2}u_2\right)^2 \tag{10}$$

and this implies that

$$u_1 < 0 \tag{11}$$

Through the raising of each side of the equation (10) to the square, one can see that the boundary of the region is defined by equation

$$4u_1^3 + 27u_2^2 = 0 \tag{12}$$

This equation delineates cusp curves on the control set, i.e. on the (u_1, u_2) plane. This is shown in Fig. 4 together with a series of graphs z with respect to x for various types of u_1 and u_2 values. Outside the cusp region, there is only one root and it is always a minimum.

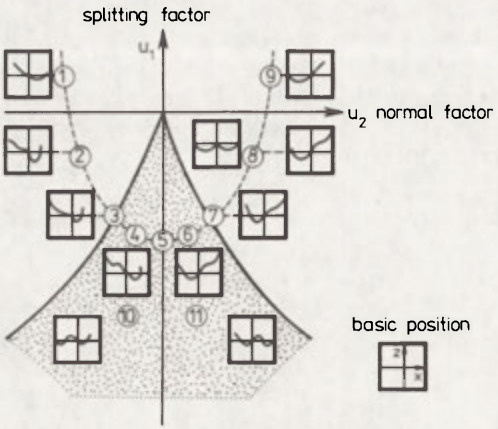

Fig. 4. The set of controls and objective functions for typical cusp catastrophe (Wilson 1981, p. 26)

Inside this region, there are three real roots and there is always one maximum (unstable state) and two minima which may be checked by investigating the second derivative of function z. So the dotted region is a set of catastrophes and its boundary is a bifurcation set where the local minimum disappears. In Fig. 4 it occurs, for instance, in point 3 and 7. The minimum which disappears is joined to the local maximum, creating the point of inflexion on the boundary. The u_1 axis for $u_1 < 0$ represents a set of conflicts where there are two minima of equal value which is expressed by point 5 in Fig. 4.

The surface of equilibrium states (x, u_1, u_2) creates the known fold surface shown already in Fig. 2 and 3. It is easy to see that the critical cusp region on the control set is a projection of the folded part of the surface.

The details concerning trajectory of some system depend mainly on the delay convention. In case of a perfect delay, the jump occurs if the projection of the trajectory of the system on the control set passes the second edge of the critical region. For example, in Fig. 4, if the projected trajectory is represented by the dashed curve, it remains in the minimum of positive x until it reaches point 7 in which the minimum disappears and a jump occurs although it passes the bifurcation line in point 3. If the same trajectory is considered in a reverse direction, the jump occurs in point 3 rather than in point 7 since the convention of the perfect delay gives the effect of hysteresis.

3. REAL SYSTEMS SUBMITTED TO TESTING

An attempt to test the catastrophe theory through its exemplary applications is made in turn. Data of the Polish regional statistics are used. The examples considered are not connected with the profound socio-economic reforms now occurring in Poland. However, putting forward the problem of sudden and discontinuous changes may be inspiring for reformatory scholars working in economics, sociology, and political sciences. This may also be of some interest for scholars in other countries in East-Central Europe.

An attempt was made to apply this theory to important fields of spatial economy, the mathematical models being relatively simple, in order not to cause trouble in calculations at the very beginning. Fields were selected whose state, according to common knowledge but also in the light of empirical research, undergoes sudden and discontinuous changes implying negative effects.[2]

[2]The term 'catastrophe theory' may be misleading in a sense. It suggests the valuation of the behaviour of the described system. As a matter of fact, behaviour consistent with the catastrophe theory does not have to signify anything negative. A catastrophe, in the sense assumed by R. Thom, as a certain kind of sudden and discontinuous changes, may also signify positive behaviours and positive effects.

Let us consider in turn: (1) the continuous rural to urban outmigration, resulting in the depopulation of rural areas in many regions, (2) situation of small towns in what is occasionally referred to as the shadow of a great city.

The rural to urban outmigration has been an intended effect of the socio-economic policy over a long time. This made the industrialization of cities possible and facilitated the advancement of rural population. However, they took the size which is now distressing; especially, the population remaining in rural areas ages and its number, although still large, does not ensure the healthy demographic and socio-economic development of rural areas in many regions.

The second problem is characterized by the example of the Poznań voivodship. The analysis of population statistics indicates a constant growth in the city of Poznań, other towns of the Poznań agglomeration (Swarzędz and Luboń), as well as of subregional urban centres located at a greater distance from Poznań. The latter create their own gravitation and service areas and their own sources of development (Gniezno, Września, Środa Wlkp., Śrem, Nowy Tomyśl, Szamotuły, Oborniki). The situation of the population of the small towns located in the transition zone between the agglomeration and the subregional centres, is different. This zone may be called the shadow of the large city. The towns which are included in this zone are: Czerniejewo, Dolsk, Kórnik, Lwówek, Murowana Goślina, Pobiedziska.

4. THE FORMATION AND ANALYSIS OF THE SYSTEM EQUATION

The application of mathematical tools of the catastrophe theory, as is the case with any new method, creates a number of conceptual and calculatory problems. The procedure used in this chapter consists of the following steps: (1) the formation of the system equation, (2) the mathematical analysis of the equation, (3) an experiment for the selection of an adequate system equation, (4) the performance of complete calculations on the base of statistical data, (5) the interpretation of the results, (6) the evaluation of the results, (7) the supplementary experiments aimed at the obtainment of the classical image of a catastrophe.

There is a wide range of freedom in choosing a form of the system equation. The attention is focused on the adequacy of equation to nature and the tendency of the system. An assumption was made that the considered real systems have the property of self-regulation and tend to the states of equilibrium. As the extremes of the equation are searched for, its non-linear form is relevant. The polynomial equation containing the state variable in any power and control variables, is the easiest to analyse. The state variable should be at least in the third power so that after differentiation x^2 is obtained, i.e. still a non-linear form. If the equation of the state were linear, it would mean that the system it describes cannot make jump changes. In the creating of the system equation, it was assumed how many and which variables are needed and in what power. At the same time, the position of the control variable u is not indifferent; it should be connected with the state variable x so that after the reduction as a result of differentiation u still occurs in the differential. The occurrence of the isolated term u in the initial form of the system equation is not interesting.

In the selection of coefficients of the system equation, the least squares method can be used. Their significance is checked by means of the Student t test. Apart from the significance of particular coefficients, the significance of the whole equation is also checked. Its aim is to find the correspondence of the structure of the equation with the structure of the real system.

The analysis of the system equation consists of two steps: (1) the calculation of the differential of this equation with respect to the observed state x and (2) the calculation of the extreme conditions of the system equation. The differentation of the function with respect to the variable x makes it possible to define the dynamic properties of the system. In turn, the calculation of extremal conditions, i.e. the solution of equation $\frac{dz}{dx} = 0$ informs on the state towards which the system tends.

As a result of both those steps, the z term disappears and only variables x, u remain. The relationship between them is now a central problem. Namely, the dependence of x on u is calculated, assuming a certain range of variability of u, which is of interest.

The further procedure consists of the experiment to determine the type of equations which could be applied in the study of real systems. In the course of experimenting, ten types of equations were analysed (Table 1).[3]

TABLE 1. Searching for adequate system equation for three problem situation

Type of equation	Multiple correlation	Statistics F	Multiple correlation	Statistics F	Multiple correlation	Statistics F
$x^3 + ux$	0.70	11.1	0.52	1.28	0.86	12.2
$x^3 + ux^2$	0.69	10.3	0.50	1.19	0.87	12.3
$x^3 + x^2 + ux$	0.72	7.9	0.57	1.00	0.90	10.4
$x^3 + ux^2 + ux$	0.78	11.5	0.51	0.74	0.90	10.6
$x^4 + ux$	0.71	11.6	0.42	0.74	0.87	12.3
$x^4 + ux^2$	0.70	10.9	0.47	0.98	0.87	12.3
$x^4 + ux^2 + ux$	0.79	12.0	–	–	0.91	11.0
$x^4 + x^2 + ux$	0.72	7.9	0.55	0.89	0.90	10.4
$x^4 + x^3 + ux$	0.72	7.8	0.52	0.76	0.90	10.3
$x^4 + ux^3 + ux$	0.77	10.9	0.48	0.61	0.91	10.9
F $\alpha = 0.05$						
$k = 3$		2.98		3.71		3.59
$k = 4$		2.74		3.48		3.36
t $\alpha = 0.05$		2.06		2.23		2.20
$\alpha = 0.1$		1.71		1.81		1.80

k – degrees of freedom.

The selection of the most adequate equation is of great importance for drawing conclusions concerning the modelled system and the prediction of its behaviour. If this selection is adequate, the inference and prediction give results which can be referred to with greater confidence.

5. EMPIRICAL DATA AND RELATIONSHIPS

In testing models based on the catastrophe theory for the two mentioned fields of spatial economy, the following empirical data were applied and the following relationships were adopted.

(1) The state of rural and urban areas is characterized by only one variable (x), representing the living standard in urban and rural places. This variable is a retail sale of goods. The difference in the level of *per capita* sale characterizes the difference in the living standard. The difference was used in computation. The control variable (u) affecting this level are investments in industry and in agriculture. And the difference between these variables is important again. The difference in the living standard impel, generally, the rural population to towns, and investments, depending on the ratio of outlays may either intensify this tendency or oppose it. Thus, migration is a balancing factor. As long as the living standard in towns is

[3] Experiments, selection of equations and numerical calculations were performed by Jan Dawidowski, M.A.

higher, there is a tendency to migrate. The overcrowding of urban places, shortage of housing and infrastructure, stopping the increase in working places in largest cities restrain the inflow of rural population into towns. Similar effects produce the increase in investments in rural areas which improve the living standard of rural population. Thus, migration is assumed to be variable z (Table 2).

(2) The state of small towns located in the shadow of a large city (variable x) is expressed by means of their size. The urban size in the period under investigation (1975–1985) decreased. Investment projects implemented in the city of Poznań were taken as the parameter which influences the state of the towns (variable u). These increased the economic potential of

TABLE 2. Rural to urban migration

Year	Net rural migration (,000) z	$\frac{\text{Retail sale of goods in urban areas}}{\text{Retail sale of goods in rural areas}} \times 100$ x	$\frac{\text{Investment in industry}}{\text{Investment in agriculture}} \times 100$ u
1960	−74,8	242	354
1961	−71,1	262	331
1962	−95,3	269	357
1963	− 102,4	266	347
1964	− 114,4	259	300
1965	− 119,7	254	276
1966	− 121,4	252	265
1967	− 135,3	245	308
1968	− 134,3	243	255
1969	− 145,2	241	264
1970	− 161,5	219	247
1971	− 171,4	220	258
1972	− 164,8	211	307
1973	− 168,0	211	327
1974	− 182,9	205	340
1975	− 251,1	200	341
1976	− 241,5	211	310
1977	− 206,5	214	256
1978	− 216,7	216	251
1979	− 210,5	222	215
1980	− 192,0	227	210
1981	− 163,5	209	179
1982	− 148,2	189	154
1983	− 138,8	202	157
1984	− 118,6	211	171
1985	− 116,6	212	189

the city and its attractiveness for the residents of small towns located in the shadow zone. The average number of persons per room in the city of Poznań was taken as variable z. Since its value is high, it constitutes a factor which inhibits human migration from nearby towns to Poznań. Consequently, the population of those towns is not completely absorbed by the city of Poznań. In this sense, the shortage of housing in Poznań is a balancing factor in the settlement system of the voivodship (Table 3).

TABLE 3. The state of small towns in the shadow of the city of Poznań, 1975–1985

Year	Number of persons per room in Poznań z	The size of small towns (1975 – 100) x	Investment in Poznań (current prices; 1975 = 100) u
1975	1,13	100,0	100,0
1976	1,11	100,6	122,1
1977	1,08	100,6	120,2
1978	1,08	97,5	130,5
1979	1,04	97,6	110,1
1980	1,03	98,2	107,1
1981	1,01	98,3	110,5
1982	1,00	98,4	186,6
1983	0,99	98,7	238,8
1984	0,98	98,6	286,8
1985	0,96	98,6	360,8

6. NUMERICAL RESULTS

For the two mentioned real systems, i.e. rural to urban migration and small towns located in the shadow of the large city, the system equations were chosen from Table 1. In the next step, by their means and with the application of statistical data, the indispensable calculations were performed. The results of the calculations are as follows:

(1) Rural to urban migration

The system equation

$$z = -0.63x^4 + 0.67x^2u - 1.54xu \tag{13}$$

The differential

$$\frac{dz}{dx} = 0.25x^3 + 1.34xu - 1.54u \tag{14}$$

The solution of the equation

$$\frac{dz}{dx} = 0 \tag{15}$$

The graphic representation in Fig. 5.

(2) Small towns located in the shadow of the large city

The system equation

$$z = 4.46x^4 = 12.81x^2u + 12.6xu \tag{16}$$

The differential

$$\frac{dz}{dx} = 17.8x^3 - 25.6xu + 12.6u \tag{17}$$

TABLE 4. The dependence of differences in the living standard in rural and urban areas on investment in the context of rural to urban migration obtained from the equation of catastrophe

Differences in the living standard x	Differences in investment u
150	175
160	165
170	165
180	165
190	175
200	175
210	185
220	185
230	195
240	205
250	215
260	225
270	235
280	245
290	255
300	275
310	285
320	295
330	315
340	325
350	345

TABLE 5. The dependence of the size of small towns on investment in Poznań in the context of the housing shortage in Poznań obtained from the equation of catastrophe

Size of small towns x	Investment in Poznań u
60	135
70	115
80	115
90	125
100	135
110	155
120	165
130	185
140	215
150	235

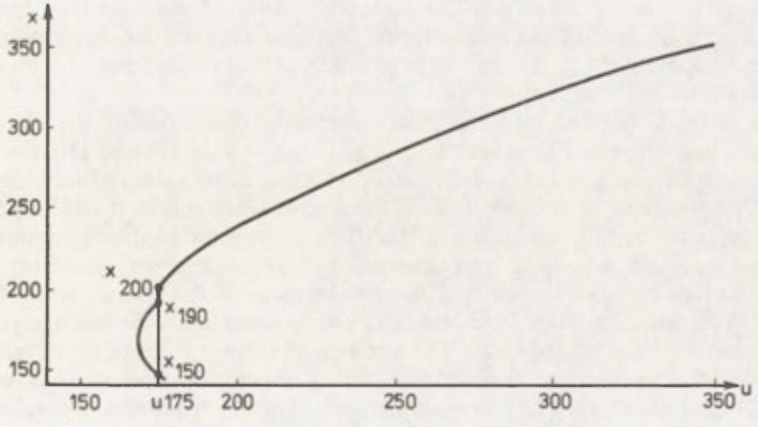

Fig. 5. Rural to urban migration. The system indicates a tendency to sudden changes x – state variable, u – control variable

The solution of the equation

$$\frac{dz}{dx} = 0 \tag{18}$$

The graphic representation in Fig. 6.

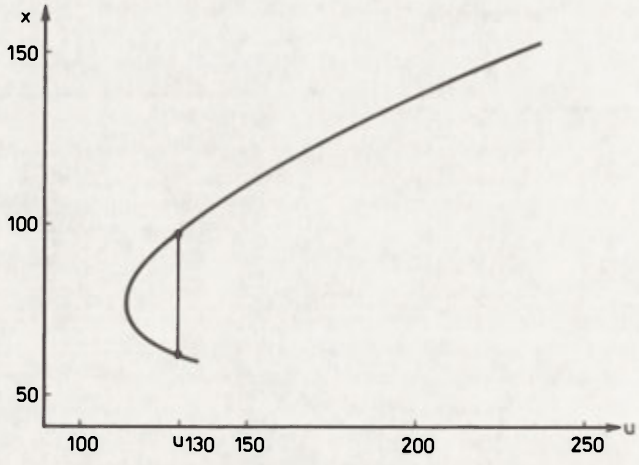

Fig. 6. Small cities in the shadow of a large city
x – state variable, u – control variable

Statistical inference confirmed adequate choice of equations for both systems. The multiple correlation coefficients are high and equal 0.79 and 0.91, respectively. The Student test indicated their significance. The F statistics, with $k = 4$ degrees of freedom, exceed considerably the critical values, amounting to 2.74 and 3.36, respectively, showing the adequacy of the whole equation (for the first system $F = 12.0$, for the second $F = 11.0$).

7. GRAPHIC REPRESENTATION AND INTERPETATION OF RESULTS

The interpretation and evaluation of the numerical results is focused on the dependence of the state variable x on control variable u. In the first case, i.e. rural to urban migration, the graphic representation of the results can be seen in Fig. 5. The dependence of x on u assumes the shape of a parabolic function.

It can be noticed that here there occurs a necessary condition for the discontinuous changes, jumps, catastrophes. For instance, for $u = 165$, $x = 160$; 170 and 180. For $u = 175$, $x = 150$; 190 and 200, for $u = 185$, $x = 210$ and 220. Thus, many values of variable x may be subordinated to one value of variable u. Then this occurs when u is in the 165–185 interval.

The system under consideration shows, therefore, a tendency to discontinuous changes. Such a property of the system is very important. This creates the possibility of either acceleration or retardment of the path of the development of the system. Instead of going through either the semi-circular or folded trajectory, the system omits the fold and jumps from one level to another by the shortest way. The assessing of various paths of the development of spatio-economic systems on the base of the earlier experience, comparisons with other countries or the system of values recognized by society makes it possible to evaluate which trajectory is more advantageous – the elongated or the jump one. If the jump trajectory one should select such parameters of controls that may force a jump in the system. In the case of the negative context, one can also force a jump transition from a more to less negative

state. Which value of the parameter u to choose, the larger or the smaller one, is a matter of spatio-economic policy. The jump behaviour and possible acceleration depends on this choice.

It should be emphasized that making a prediction and the possible influencing of the system's behaviour is reasonable if the system is well described by the equation. In other words, if the system equation is selected well. This makes the prediction more reliable and the activity compatible with it becomes better justified.

In the second case, i.e. in a group of small towns located in the shadow of the large city, the possibility of the occurrence of a catastrophe appeared again (Fig. 6). The curve has the shape of a parabole, as it was in the first case. For u in the 115–135 interval, two values of the state variable x to one value of this parameter may be subordinated. For instance, for $u = 130$, $x = 62$ and 96. Therefore, a condition is fulfilled for the occurrence of discontinuous changes. Calculations confirmed the adequacy of the selection of the system equation. It is, therefore, justifiable to make predictions on the base of the dependence of x on u and suggest instruments of the influencing of x in order to accelerate changes in the state of the system.

Not enough experience has been acquired in applying the catastrophe theory to assess its usefulness. Its usefulness through the indication of the ways of accelerating development and a fast reduction of the negative states seems indisputable. It is also argued that this usefulness may be raised through a combination of studies by means of the catastrophe theory with studies performed by means of other methods including simpler statistical methods. Studying some properties of the catastrophes, especially jump changes, hysteresis and divergence by means of this method seems promising. Such studies seem particularly useful because of the reforms in the socio-economic system of Poland and the whole of Central-East Europe, as well as the possibility of the occurrence of other changes difficult to anticipate at present. The catastrophe theory is an appropriate method for the study of such peculiar changes.

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SPATIAL POPULATION MOBILITY IN POLAND, 1952–1985

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This paper contains a summary of a larger study (Gawryszewski 1989). The study consists of three parts: the first, most extensive part is devoted to permanent migration; the second part – to commuting to work; and the third part – to other forms of spatial population mobility, i.e. the students' migration and commuting to school, tourist/recreational migration, and pilgrimages to sanctuaries.

The main aims of the study are:

– to describe spatial patterns of different types of migration *vis-a-vis* national socio-economic change on the basis of the available unified statistical material, using a possibly long time-horizon;

– to identify changes in the intensity and range (distance) of those movements;

– to propose a hierarchical regionalization of permanent migration based on inter-voivodship flows, using the Slater method, as well as to identify the stage by the process of modernization of spatial mobility which has been reached in Poland.

On the conceptual level, the aim of the study is to test Zelinsky's mobility transition hypothesis under the socio-economic conditions different than original.

The mobility transition hypothesis refers to the theory of demographic transition. The latter theory reflects the historical process of transformation from high natural population reproduction and high mortality, as characteristic of pre-industrial societies, to low reproduction and low mortality, which are characteristic of post-industrial societies. According to Smoliński (1981, 1986), Poland is entering advanced, fourth, phase of this process.

Mobility transition hypothesis is an empirical generalization of the historical changes in mobility which have been occurred in what are now highly developed countries. This hypothesis points out that with societal and economic development – from the stage of traditional society (phase I), through that of the early (phase II) and advanced (phase III) modernization, to that after the modernization (phase IV) – continuous change in the prevailing forms of migration takes place. New, alternative forms of movements arrive and expand, from the shortest (circulation) to intercontinental movements. All these forms of movement are to be analysed within the same conceptual framework.

The following basic statistical data were used in the present study:

(a) for permanent internal migration – those from the current population register, i.e. annual intra- and inter-voivodship flow matrices: total and by the four basic directional categories (i.e. rural to urban, urban to rural, urban to urban, and rural to rural), 1952–1983;

(b) for commuting to work – the results of the Staff Censuses 1968, 1973 and 1983, and those of the National Census 1978;

(c) for students' migration and commuting to school – the results of the investigation of the "students's way to school" by the Central Statistical Office, 1965/66 and 1980/81;

(d) for tourist/recreational migration – various data from the Central Statistical Office, 1950–1985;

(e) for pilgrimage to sanctuaries – the work by S.Z. Jabłoński (1984) about the pilgrimage to Jasna Góra, 1864–1914, and the work by H. Zug (1984) for the more recent period, and the 1985 data.

The analysis of the permanent migration, 1952–1983, indicated:

TABLE 1. Average annual rates of inmigration and outmigration (per 1000 population, places of origin and destination) by basic directions, 1952–1987

Years	Migration from			
	rutal to urban	urban to rural	urban to urban	rural to rural
	inmigartion			
1952–55	32.9	16.9	35.7	25.1
1956–60	24.2	15.4	23.5	30.6
1961–65	17.4	10.2	15.0	22.9
1966–70	15.4	7.2	11.6	19.5
1971–73	15.8	7.1	11.2	18.3
1974–75	16.7	6.1	13.8	14.3
1971–75	16.2	6.7	11.2	16.7
1976–80	16.7	8.3	13.1	14.1
1981–85	11.8	7.7	9.4	10.7
1986–87	9.9	6.4	7.5	10.2
	outmigration			
1952–55	23.4	23.8	35.7	25.1
1956–60	20.9	17.9	23.5	30.6
1961–65	16.6	10.7	15.0	22.9
1966–70	16.0	6.9	11.6	19.5
1971–73	18.0	6.3	11.2	18.3
1974–75	20.4	5.0	13.8	14.3
1971–75	18.9	5.8	11.2	16.7
1976–80	22.6	6.1	13.1	14.1
1981–85	16.7	5.4	9.4	10.7
1986–87	15.3	4.2	7.5	10.2

Source: own calculations.

– a continuous decrease in human (especially urban) population mobility (Table 1), except for a slight increase in the late 1970s;

– a decrease in mobility of the rural population which, during the recent three decades was more mobile than the urban population;

– a decline in spatial differentiation of in- and outmigration flows; traditionally, rural-to-rural migrations were characterised by highest spatial differentiation, in recent years, however, those differences have been reduced considerably;

– the continuous increase in the share of the regional (intra-voivodship) migration (Fig. 1), except in the 1976–1980 period, when urban-to-urban migration expanded up to the supra-regional scale.

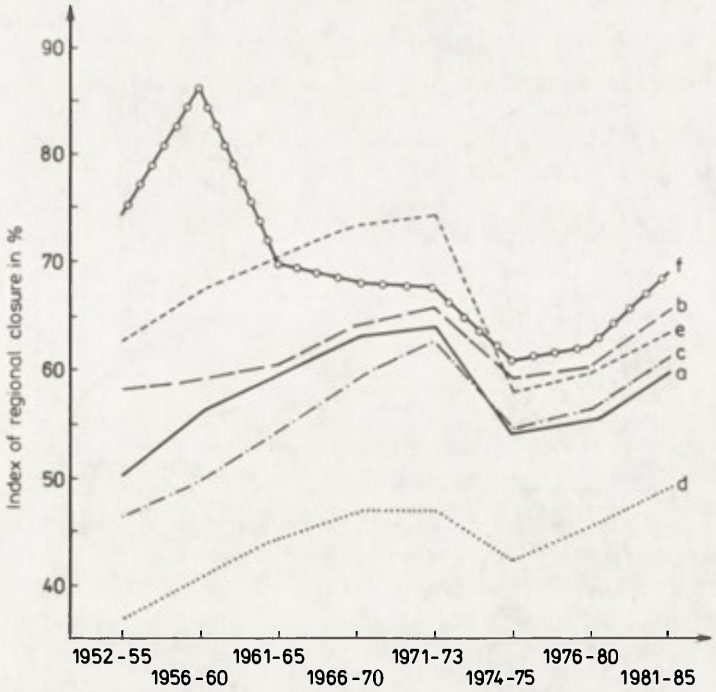

Fig. 1. Mean annual index of regional (voivodship) migration closure, 1952–1985
a – total, b – rural to urban, c – urban to rural, d – urban to urban, e – rural to rural, f – net migration in urban

TABLE 2. Mean distances of permanent migration, including intra and inter-voivodship flows (in km), 1952–1983

Years	Total	Mean distances of migration			
		rural to urban	urban to rural	urban to urban	rural to rural
intravoivodship migration included					
1952–55	149	125	158	177	136
1956–60	141	132	153	166	123
1961–65	124	120	140	149	110
1966–70	115	106	130	143	100
1971–73	109	99	119	138	96
1974–75	103	94	115	118	93
1976–80	105	93	106	133	90
1981–83	98	86	98	127	83
without intravoivodship migration					
1952–55	283	272	285	277	299
1956–60	288	287	287	283	295
1961–65	273	275	283	278	278
1966–70	246	266	281	275	264
1971–73	265	261	275	271	258
1974–75	209	198	225	228	191
1976–80	207	199	214	224	188
1981–83	207	198	209	226	185

Source: own calculations.

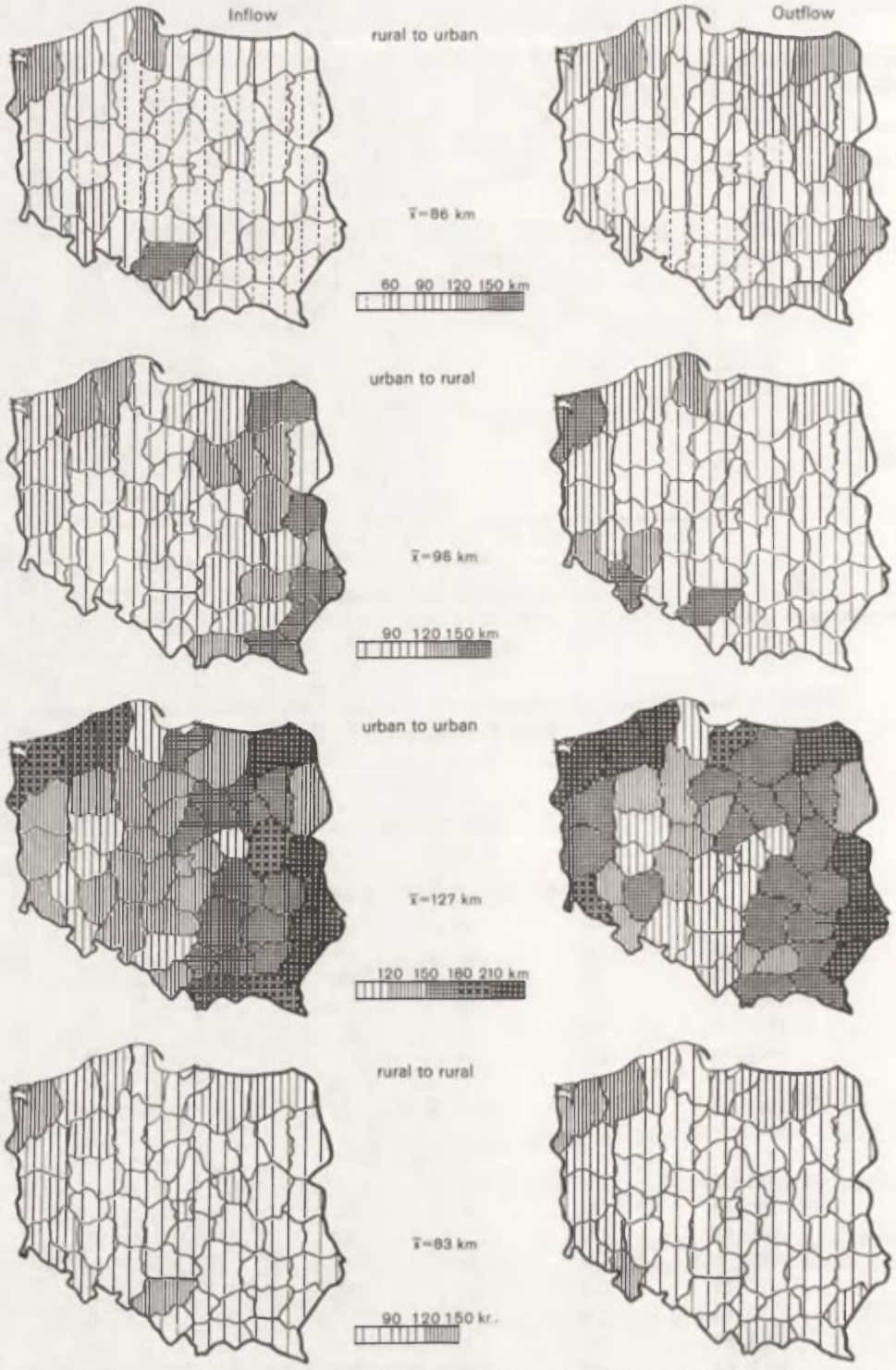

Fig. 2. Weighted means of migration distance by basic directions of migration, 1981–1983

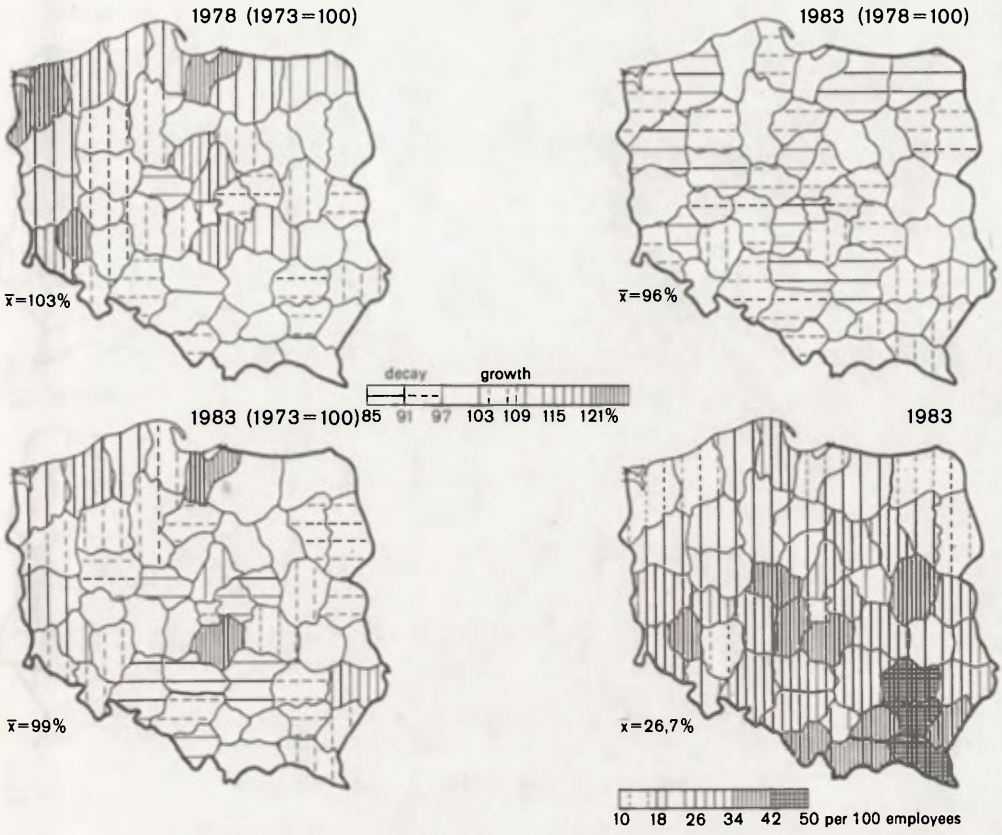

Fig. 3. Change of intensity of commuting to work

The analysis of the weighted mean distance of migration (both intra- and inter-voivodship) confirmed a considerable decrease in the range of permanent migration (Table 2; Fig. 2).

In the 1952–1983 period, the mean distance of migration decreased by 30 to 40%, depending on the direction of migration. The reported tendency in the mobility transition process was opposite to that observed in the United States where the mean distance of inter-state migration, which amounted to 975 km in the 1935–1940 period, increased to 1109 km in the 1949–1950 period. In Poland, on the contrary, the distance of inter-voivodship migration decreased from 283 km in the 1952–1955 period to 207 km in the 1981–1983 period.

The analysis of internal migration is concluded by an attempt to regionalize migration patterns during the 1952–1983 period, based on inter-voivodship flows (total, rural to urban, and urban to urban), following the method developed by P.B. Slater (1974, 1975, 1976abc).

The analysis of commuting to work may be briefly summarized as follows:

– the increase in the volume and intensity of commuting to work in the 1972–1978 period was followed by its spatially diferentiated decrease in the next semi-decade (Fig. 3);

– the increase in the mobility during the 1973–1978 period was a result of the increase in the intensity of the commuting to work predominantly in the voivodships with commuting to work, mainly in the voivodships with large-scale industrial investment projects; the more recent decrease in the mobility in those voivodships was a result of the contraction of the investment programmes;

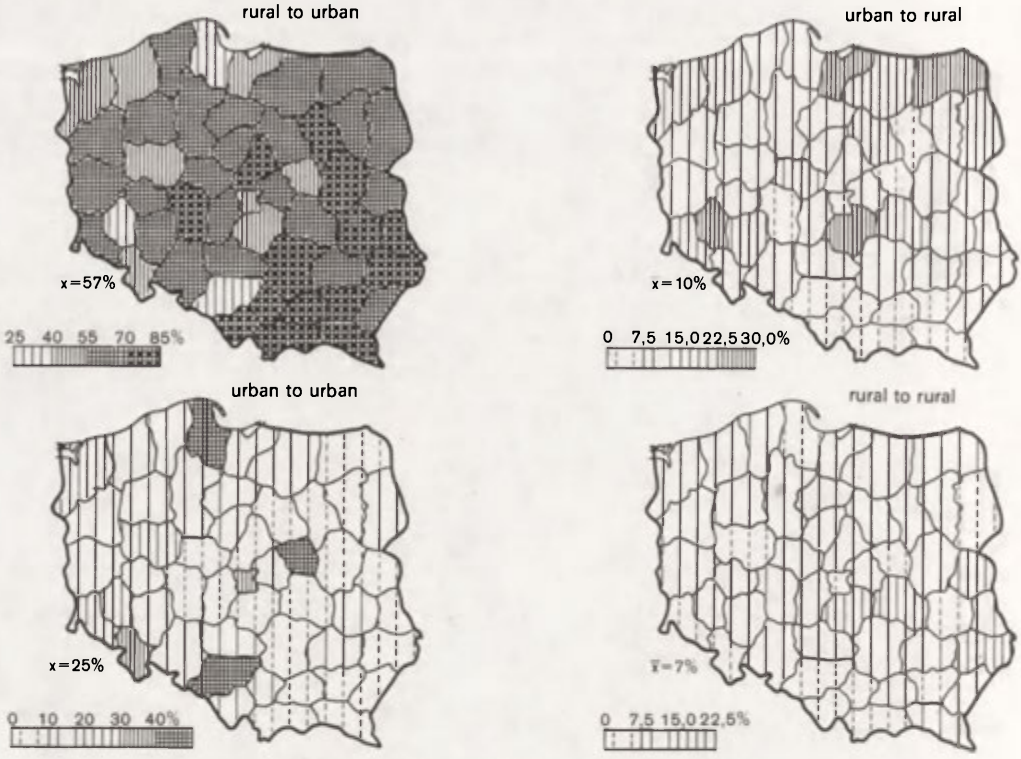

Fig. 4. Commuting to work in 1983 by basic directions

– a stable high level of the mobility during the 1973–1983 period is characteristic of the south-eastern voivodships, with their traditionally high intensity of commuting to work (Fig. 4);

– in the 1973–1983 period, the degree of the regional closure of commuting to work increased in the cases of the overwhelming majority of voivodships.

The analysis of commuting is supplemented by the calculation of the weighted mean distance of the commuting to work to fourty-nine voivodship centres in 1959, 1968, 1973, 1978 and 1983. A statistically significant, although not strong, correlation was established between the urban size and the mean distance of commuting to work. Large cities occupy the highest ranks in this respect (23 to 30 km) while small and middle-sized towns prevail in the group of centres of which the shortest distances of commuting to work are characteristic. Moreover:

– the higher the education level of the commuters, the longer the distance they travel, the commuters to towns of 200 000 inhabitants and more being an exception;

– there are no considerable differences in terms of the distance of commuting to work between commuters, depending on the age groups of commuters;

– men commute to work over longer distances (23 km) than women (20 km);

– the increase in the distance of commuting in the 1973–1978 period was followed by a decrease in the distance in the next semi-decade.

When considering students' migration and commuting to school (Fig. 5), the following observations may be reported:

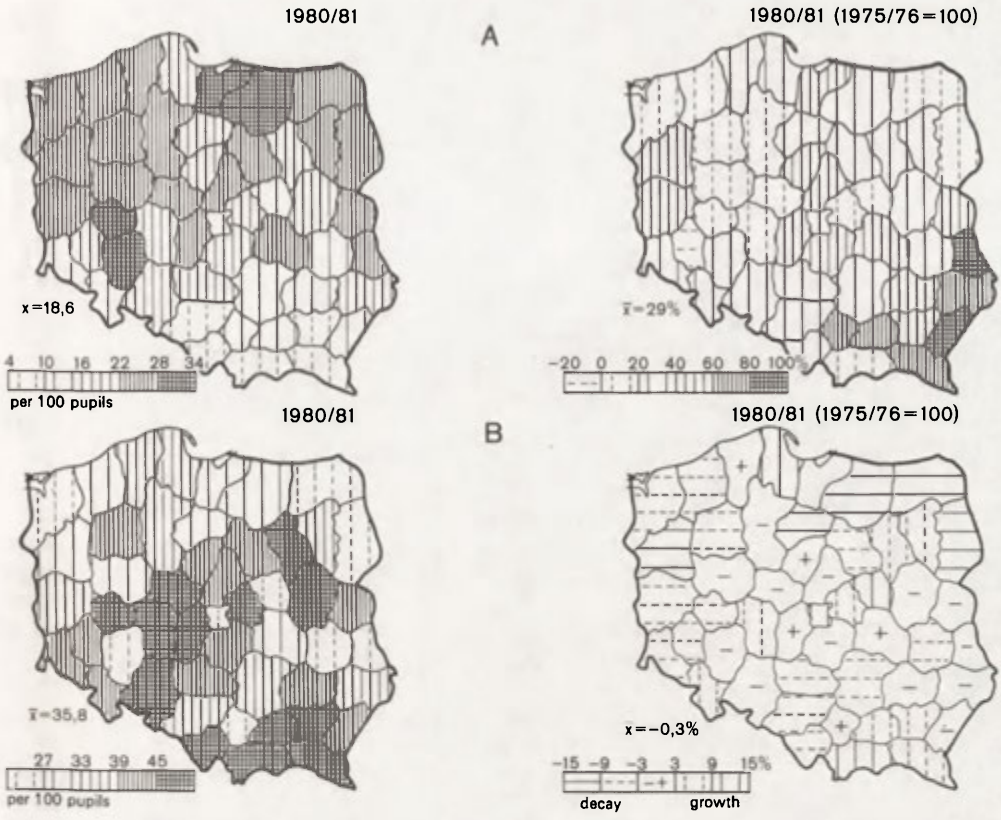

Fig. 5. Commuting to primary (A) and secondary (B) schools per 100 students, and changes

– the intensity of commuting to primary schools is higher in the northern than the southern part of Poland while the distances of commuting are longer in the eastern part of Poland. In the recent semi-decade these distances increased considerably in the north-eastern voivodships;

– the intensity of commuting to secondary schools (with 36% of students commuting) prevails over that of commuting to work (26% of employees commuting); the spatial patterns of the two movements are similar. The distances of commuting to secondary school have increased.

The tourist/recreational migrations are presented with the help of different indices on Fig. 6 and 7. Some of the results are based on the Central Statistical Office questionnaire concerning the participation of people in tourism, recreation and cultural activities.

The author's assessment of the process of the mobility transition in Poland is that the smooth development of this process has applied for many years only to those forms of mobility which were to a rather small extent influenced by the state policy, i.e. to purely circulatory types of movements (tourist/recreational journeys and those for social and cultural reasons). On the other hand, the development of permanent migrations and commuting to work was strongly dependent on economic change and socio-economic policy. These result in a discontinuity of changes in mobility; this may be exemplified by the increase in the size and mean distance of urban-to-urban migration in the late 1970s, and the accelerating decrease in the volume of migration since the begining of the crisis of the 1980s.

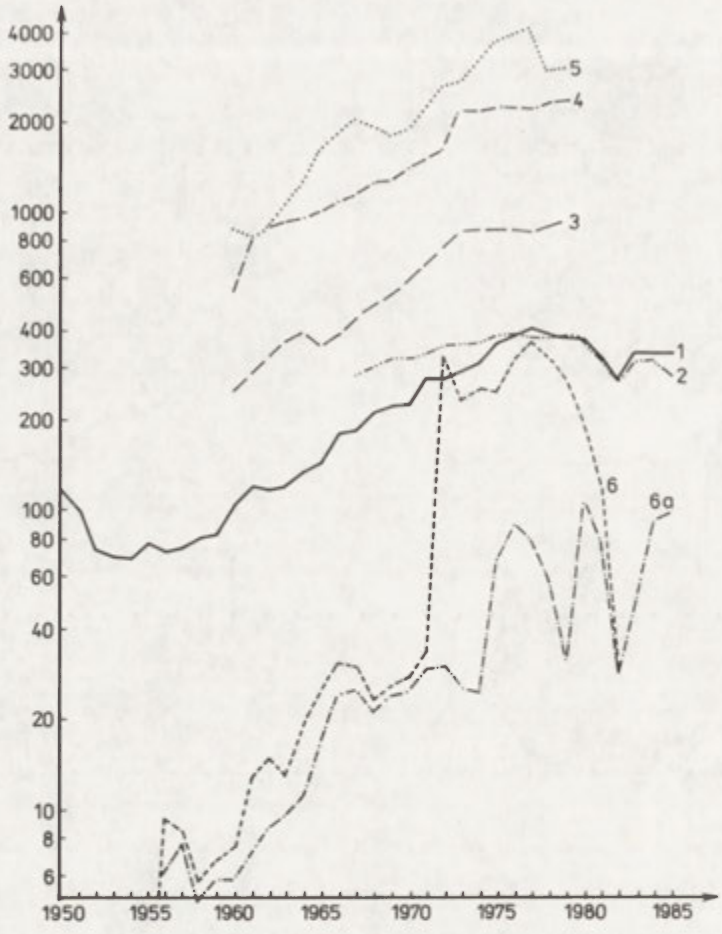

Fig. 6. Tourist and recreational migration, 1950–1985

Number of persons using: 1 — holiday and recreational centres (per 1000 employees in state-owned and cooperative sectors of economy), 2 — night lodging in tourist hostels (per 1000 population); Number of persons participating in: 3 — tourist visits over 3 days, 4 — tourist excursions, 5 — one-day recreation trips (per 1000 urban population); Tourist foreign migration: 6 — total (including departure without passports to socialist countries), 6a — departure on the ground of passports (per 1000 population)

To conclude, a question can be asked how the process of mobility transition will further develop in Poland. To answer this question requires assumptions to be made concerning the socio-political and economic system in Poland. Changes in mobility, therefore, can either be still of a discontinous character or they can follow the new model of the national development which would include sectoral and territorial restructurization of the economy, social self-reliance, territorial self-government, indispensable changes in agriculture and the agriculture-supplying industries, the development of rural technical and social infrastructure, and the effective solution of the housing shortage. In the latter case, changes in the forms of mobility would follow those observed in the highly developed countries. Instead of an increase in urban-to-urban and intra-urban migrations, which is characteristic of the third phase of mobility transition, a new trend of migration may appear, i.e. that of out-migration (especially of persons with high professional skills) from the large urban agglomerations to the suburban

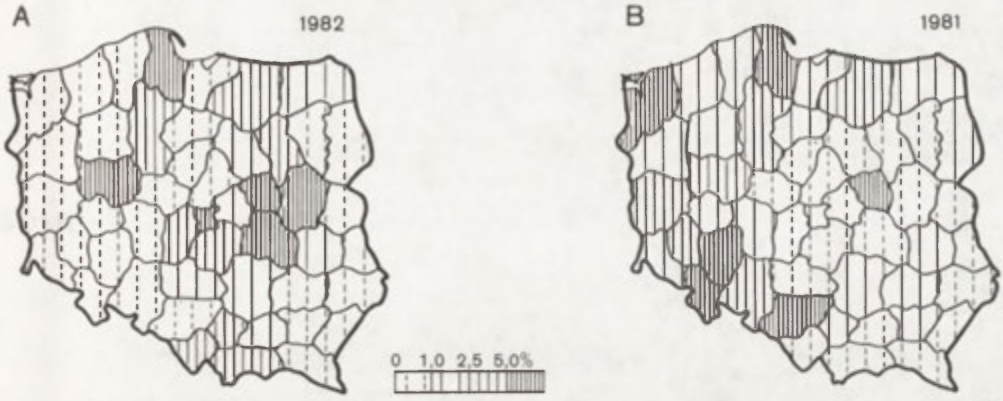

Fig. 7. Geographical distribution of: (A) summer houses (B) allotment gardens (percent of total), after M. Gorczyca, 1983a,b

zones which have good environmental conditions for the location of hi-tech enterprises. The right answer to the question concerning further development of the mobility transition will certainly be important for the comprehensive assessment of spatial mobility in Poland which is one of the basic aims of development of time geography.

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SOME REMARKS ON RECENT TRENDS IN REGIONAL POPULATION DYNAMICS IN AUSTRIA

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1. REGIONAL DEMOGRAPHIC TENDENCIES AT THE BEGINNING OF THE 1980s

At the beginning of the 1980s the regional demographic system of Austria seemed to be invariable for a long time. There was a common belief by demographic experts that the total population figure for Austria tended to shrink in the future. The implications of the process of demographic ageing were seen as the most important problems caused by the expected demographic dynamics. Since in Eastern Austria (Vienna, Lower Austria, Burgenland) the share of old people was much higher than in the rest of Austria, multiregional projections showed the picture of a declining share of Eastern Austria within the total. The validity of such projection were supported by two other trends, i.e. the general decline of the interregional migration, and the declining, low fertility rates with significant differences from the Austrian average (which was also below the reproduction level).

A multiregional population projection based on *status quo* assumptions was worked out about 1984 (Sauberer and Spitalsky 1987). For the period 1981–2011 a significant decline of population in spite of a net migration gain in Eastern Austria was calculated (−7.6%), a similar tendency was found out for the large towns (−17.9%). For Vienna a decline of the population figure of nearly 20% within the period 1981–2011 was projected (Table 1). On the level of districts (altogether about 100 in Austria) the results showed an increase of the share of

TABLE 1. Population projections for the main regions of Austria, 1981–2011

East	−7.6%
South	−4.3%
Central	+5.9%
West	+17.2%
Austria	−0,4%

suburbanized areas. Also, the number of old people (over 60) shows the highest rates of increase in this type of regions (in some parts of Western Austria nearly 100% within the period 1981–2011).

2. THE RECENTLY OBSERVED TRENDS

2.1. GENERAL OVERVIEW

The very recent demographic figures are showing some more or less surprising new tendencies. In summarized form the following tendencies are noticeable:

– An increase of international immigration by at least 50%. The main destination for this migration stream of mainly young people is Vienna.

– A decrease of outmigration from the large cities to suburbanized areas.

– A discontinuity of the fertility decline; in fact a small increase of fertility for Austria as a whole. The corresponding increase for Vienna and other large towns is significantly higher. The fertility figures for individual districts are showing a tendency to converge.

2.2. REGIONAL CONSEQUENCES

On the regional level the reappearance of a population growth in Vienna is the most important fact. Even very cautious estimates – as made by *Österreichisches Statistisches Zentralamt* (1989) – are showing an increase of population of the capital of Austria in 1988. For the first time since the 1950s the surplus of net migration (+10.100) is exceeding the birth deficit. Therefore, Vienna seems to be at the beginning of a new, although moderate growth phase (Table 2).

TABLE 2. Estimated annual net migration balance of Vienna

1979–1989	−1.000
1981–1985	+1.000
1986–1989	+10.000

Source: Sauberer (1989), modified and updated.

One has to take into account the fact that a growing number of foreigners is living in Vienna without registration. Therefore, the real net migration surplus is much higher than officially estimated. The Statistical Head Office of the City of Vienna notified in October 1989 some new estimates of demographic figures. According to those, Vienna had 1.510 million inhabitants (Census 1981: 1.531) at the beginning of 1988. The number of foreign citizens was estimated at 140 000. As to the number of non registered foreigners only very crude estimates are available; these vary between 50 000 and 100 000. Taking these figures into account the

TABLE 3. Total fertility rate of Vienna and Austria: 1970, 1975–1989

Year	Vienna	Austria	Year	Vienna	Austria
1970	1.65	2.29	1982	1.39	1.66
1975	1.40	1.83	1983	1.34	1.56
1976	1.27	1.69	1984	1.33	1.52
1977	1.24[a]	1.63	1985	1.32	1.47
1978	1.27	1.60	1986	1.33	1.45
1979	1.28	1.60	1987	1.35	1.43[a]
1980	1.35	1.65	1988	1.40	1.44
1981	1.41	1.67	1989	1.42[b]	1.45[b]

[a]minimum, [b]estimated.

real net migration surplus reached about 14000 in 1988 (Austrians −2500, foreigners − +16500). It is worth to be mentioned that the annual net migration surplus between 1870 and 1910 (which was the great growth era of Vienna) reached about 17000. A second reason for the changing sign of population dynamics in Vienna is the increase of fertility (Table 3).

3. SOME REMARKS ON CAUSES AND IMPLICATIONS OF THE NEW DEMOGRAPHIC TRENDS

The causes of the increase of international immigration especially to Vienna are influenced *inter alia* by the following factors (see also Sauberer 1989):

– an increase of international attractivity of Vienna as a central place at the highest international level,

– an increase of the quality of life, especially caused by urban renewal and the improvement of outdoor recreation facilities,

– the improving labour market situation which is a long term consequence of the demographic changes, a decrease in the number of people in the working age,

– the developments in Eastern Europe towards free outmigration,

– the general "demographic pressure" on the part of developing countries.

The decrease of the urban-suburban migration is a consequence of the urban renewal process and also of the overcrowding in some suburbanized areas. The increase of fertility rates may be interpreted as a change of the social value systems which is spreading from the centres towards the periphery. Also, the higher emphasis on the needs of families with children by the urban policy-makers have to be taken into account.

The new tendencies, in the case they will hold for a long time, lead to a new picture of demographic future. The shrinking process will be nearly stopped. From the regional point of view Eastern Austria will be the winner. There are some plausible scenarios that the new demographic trends will not only favourably influence the development of Vienna but also of Lower Austria, which is the province surrounding Vienna. First cautious new multiregional demographic projections are already worked out (cf Table 4).

TABLE 4. Projected population dynamics in Austria worked out in 1988

	1981–2011	1981–2031
Eastern Austria	−3.4%	−8.6%
South	−1.6%	−9.9%
Central	+7.0	+3.5%
West	+20.9	+20.3%
Austria	+2.5%	−1.8%

Source: Sauberer and Spitalsky, in print.

Finally, the newest projection of the Austrian Statistical Head Office is worth to be mentioned. In this projection a constant population figure of Vienna till 2010 (about 1.482 million) and an increase in the period 1910–2030 (to 1.513 million) is assumed. According to this projection, Vienna will tend to a relatively "young city", in terms of its age composition (Table 5).

TABLE 5. Share of age-groups (per cent)

	Under 15 years			Over 60 years		
	1988	2015	2030	1988	2015	2030
Vienna	13.7	14.9	15.5	35.0	32.4	35.2
Austria	17.5	14.5	14.0	27.3	33.0	41.6

4. CONCLUSIONS

New tendencies of the demographic change in Austria justify a reevaluation of the earlier demographic projections. From the policy-oriented point of view the new situation may be characterized as a double demographic challenge. This means that on the one side Austria (mainly its western provinces) is confronted with all the implications of the demographic ageing process, whereas on the other side (in Eastern Austria) the consequences of the immigration of mainly young people from abroad will form the main problem.

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CHANGES IN MIGRATIONAL PATTERNS DURING THE CRISIS AND REFORM IN POLAND

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The following report is based on three analytical studies: a monograph by A. Gawryszewski on spatial population mobility in Poland in 1952–1985, and two papers of my own on inter-regional migrations in 1975/76 and in 1985. All these studies are based on the available official statistics – the latter two on matrices of inter-regional permanent migration between 49 voivodships. The matrix for 1985 was additionally disaggregated into four basic directional categories: rural to rural, rural to urban, urban to rural, and urban to urban.

The data available on permanent migration are rather reliable, with only rare, temporary and regional deformations. The emerging pattern is clear and consistent. The data on other types of migrational movements are uneven and in some cases, such as recreational mobility, partial, scanty and even incidental. The present report is, therefore, limited to comments on permanent migration, involving a change in domicile only.

GENERAL MIGRATION PATTERNS IN THE POST-WAR PERIOD

During the whole post-war period, the permanent migration was characterized by a constantly falling (with a slight and passing increase in the late 1970s) mobility of the population – from a rather high level immediately after the war to a now much lower one, i.e. from 7.1 million in 1946–1950 to 3.7 million in 1981–1985 (with the total population growing from about 24 million to over 37 million). The rate of mobility has fallen, therefore, from 95 per 1000 inhabitants in 1946 to under 20 in 1985. However, after the disaggregation into four basic directional flows the general pattern is more complex.

Rural to rural flows, very high in the beginning (reaching the peak of about 500 000 in the late 1950s) fell subsequently to about 110 000–120 000 annually and since the 1980s have remained practically stable. Basically, they are intra-regional and regional in character, and amount to about 22% of all permanent migrations.

The rural to urban migration, being the most important one, had two peaks of about 400 000 annually: in the 1950s and the late 1970s, and seem to settle now at the level of 250 000. Their share fluctuates at around 33% of the total permanent migration.

Urban to rural migration decreased from about 250 000 in the 1950s to about 120 000 in 1965 and, with small variations, has remained at the same level until now. This is basically a return migration which is rather characteristic of Upper Silesia and the other southern regions. With the general slowdown in the population mobility, its importance is slightly increasing (from 12% to about 14% of the total permanent migration).

The urban to urban migration had two peaks of 400 000 around 1955 and 250 000 in the late 1970s. This is now at the level of 200 000 per year and their share fluctuates between 25% and 30% of the total permanent migration.

THE REGIONAL PATTERNS OF PERMANENT MIGRATION, 1975 AND 1976

The regional pattern of migration in 1975/1976, based on the matrix of inter-regional flows (49 voivodships), may be characterized as follows.

(1) The largest influx of migrations was directed towards the largest industrial and urban agglomeration of Upper Silesia with the second and third place taken by the Warsaw and Gdańsk agglomerations. Net migration was highly positive in those regions while it was negative in almost all others, although, as it was below the level of natural increase, the population in those regions was still growing.

(2) The zones of inflow and outflow were spatially different in the case of all urban agglomerations. Therefore, the migrational system could not be defined in simple regional terms. Evidently, there was a composite national system of interdependences.

(3) It was possible to identify three different zones of varying migrational structures and behaviours. In the south, the migrational relations were reciprocal. The flows toward industrial and urban centres were basically counterbalanced by the return migrations – more limited in size, but substantial. As a result, a stable regional system integrating smaller regions has developed. In the central and eastern parts of the country, moves to urban agglomerations were massive but unidirectional. Those moves were not compensated significantly by flows in the opposite direction. The western and northern regions were characterized by smaller flows between neighbouring voivodships – balanced among the northern coastal areas and almost balanced among the western regions.

Additional information, e.g. on the origins of population, obtained from the National Census of 1978, indicates that those structures were fairly stable.

REGIONAL PATTERNS OF MIGRATIONS IN 1985; CHANGES SINCE 1975/1976

As has already been mentioned, the mobility of population, i.e. the permanent migration during the following ten years, decreased significantly, i.e. by nearly 30%, but the regional patterns of decline were uneven. The largest slowdown of inmigration was registered in the Warsaw (by 56.1%), Łódź (by 51.3%) and Cracow (by 46.3%) agglomerations. On the other hand, the smallest decrease (under 10.0%) was observed in the rural regions. Evidently, the economic and political crisis and contraction of new industrial investment projects has affected the attraction of the heavily urbanized areas. The comparatively small decrease in the migration to industrialized Upper Silesia (at the national average level) may be explained by the permanent shortage of manpower there, both in mining and in metallurgy. This view is supported by the fact that the only area in which there was no decrease, but rather a limited increase in inmigration was to Bełchatów in central Poland, with the constructed large electric power station based on soft coal.

The decrease in outflows was more evenly distributed. Nevertheless, the largest decrease was observed in the regions which had provided the largest outmigration flows before.

Generally, the changes in migrations were connected with a decline in industrial investments and hence the availability of new jobs, as well as within urban agglomerations, with the breakdown of housing construction.

The spatial migrational patterns did not change significantly, although bidirectional reciprocal movements have increased. This supports the already expressed view that those patterns are fairly stable. However, the short distance movements in Upper Silesia were

diminishing more than the long distance migrations, indicating in this way, some change in the migrational patterns.

The disaggregation of data for 1985 into four matrices of basic flows affords an additional insight into spatial migration patterns and structures.

The rural to urban movements should be considered from two points of view: the origins of the migrations and the destinations. The first observation to be made is on a high level of regional closure in rural to urban migrations. In only three regions out of 49 was the closure of inflow in urban areas under 50%. All these regions contained the largest urban agglomerations. In the remaining regions, the closure varied from 60% to 90%. The closure of outflows from rural areas was more evenly distributed, with the minimum of 48% and the maximum of 87%. It may be therefore stated that the regional closure of rural outflows was greater than that of urban inflows.

Spatially, migration towards the urban areas of Upper Silesia dominated. It was only in 18 voivodships out of 48 that the outflow to Upper Silesia was below 200 migrants. These were mainly the regions with their own urban agglomerations but also several rural regions which either belonged to the sphere of influence of an urban agglomeration or were too remote from Upper Silesia.

The urban to rural movements, although generally the most limited, counterbalanced in a way the rural to urban migration. In 1985, they compensated 47% of the latter. Their regional closures were higher, they were also more evenly distributed. As far as rural regions were concerned, their degree of closure was higher, and in the case of the areas with large urban centres, they were lower. This phenomenon supports the view that a rural population tends to migrate for shorter distances than an urban population.

The analysis of in- and outflows from the same urban areas shows that the closure of inflows to urban agglomerations is higher than that of the outflows.

In the case of the urban to urban migration, the first rank was held by the Upper Silesian agglomeration and the second, surprisingly, by the Poznań region, followed by the Gdańsk and Warsaw agglomerations. The five voivodships of Lower Silesia represented an interesting case with their reciprocal strong inter-regional migrations. Incidentally, this macro-region was dominated (except for its strong links with the Upper Silesian conurbation) not by its largest urban centre of Wrocław, but by the Legnica copper mining region. The chain of northern and western voivodships represents another interesting case with voivodships connected with their immediate neighbours by mutually balanced inter-urban flows.

The rural to rural migrations were either highly closed regionally or limited to their nearest neighbours. Additionally, in almost all cases they were reciprocal and balanced or almost balanced. Again, the chain of the relations between northern and western regions, similar to those characteristic of inter-urban migration, could be identified.

CONCLUSION

Although the spatial migration patterns remained practically unchanged between 1975 and 1985, their intensity decreased considerably on the national and macroregional scale. The local and regional patterns seem to withstand the impact of the economic crisis much better. The dominance of Upper Silesia remained strong, but has been eroded and diffused in a way. There are now areas where migration to Upper Silesia is of no great importance.

A question has arisen recently which divides both geographers and demographers into two camps. What about the future? Is the present decrease in urban growth and the slowdown of urbanization processes a lasting and stable trend or is it only temporary? Will there be another wave of urbanization by the end of this century? In my opinion, such a renewal of the urbanization processes, if it comes to pass, will focus mainly on the middle-sized towns and will be based on regional and local migration. This will be a result of their higher

attractiveness as places to live in. After all, they will be able to provide a suitable environment, both natural and social, at the lowest costs.

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MIGRATION AND SOCIAL MOBILITY IN POLAND

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1. INTRODUCTORY REMARKS

Migration and social mobility have generated numerous empirical studies and extensive research literature in Poland. However, the relationship between those two processes has not been examined sufficiently. Studies on migration have predominantly focused on its economic, demographic and spatial aspects. Works devoted to social mobility find migration of secondary interest, and attempts to evaluate its impact upon the transformation of the structure of Polish society are undertaken rather rarely. The necessity to recognize the basic rules of each of these processes may justify such a state of affairs. It was only recently that the social aspects of migration, including the coincidence of migration and social mobility interested students. The development of those research works has been based on the prevalent assumption that migration should be treated as a type of, and factor contributing to social mobility.

The link between migration and social mobility should first be considered from the viewpoint of a causal nexus. Changes in the social status of migrants could then be interpreted as the consequences of migration and, subsequently, the strife to change the socio--occupational position – as a factor stimulating migration. In reality, it is difficult to find out which of the processes is the cause, and which the result. Both migration and social mobility are conditioned by many common factors. The dynamics, direction and concept of the spatial socio-economic development of a country in respective historical periods are of basic significance. This means that both processes, i.e. migration and society mobility, play an instrumental part in the socio-economic development as the development requires spatial and social transitions of the population. Hence, the considerations do not lead to the search for a causal nexus, but rather to the presentation of the most important attributes of the relationship between migration and social mobility.

2. POLISH STUDIES ON THE RELATIONSHIPS BETWEEN MIGRATION AND SOCIAL MOBILITY

In spite of the fairly low degree of interest of demographers and sociologists in the relationship between migration and social mobility, a number of research projects have been performed and these include, among others, the questions under discussion. Chronologically, the list begins with sociological studies.

The first attempt to establish a link between geographical and social mobility was made by M. Pohoski (1963) in his studies on rural to urban migration in the 1954–1957 period. The research focused on the intergenerational socio-occupational mobility of peasants' sons and

made it possible to reveal a close association between socio-economic and spatial mobility. Thus, the social mobility of migrants from rural areas was considerably more intense and the socio-occupational structure of peasants' sons proved to be more advantageous than that of the inhabitants of rural areas in general. As a result, the social prestige was higher in the case of a considerable part of migrants than of the inhabitants of rural areas. The rural to urban migration was a means of socio-economic promotion for peasants' sons at that time (Pohoski 1963, 157–58; 191–95).

The significance of migration in the process of social mobility was also observed in the studies carried out at the Institute of Philosophy and Sociology, Polish Academy of Sciences. Even incomplete observations indicated the importance of migration as a factor stimulating social mobility (Pilinow–Ostrowska 1970; Dejmanowska–Janicka 1970). This was particularly found true in western Poland in which intensive social mobility was characteristic. However, the results refer to an untypical, unique period in the postwar history of Poland, and the special weight of migration in the process of social mobility can be regarded as not characteristic of the whole country nor of the present period.

The relationship between migration and social mobility was also taken into account in the Polish national survey of socio-occupational mobility, conducted by the Central Statistical Office in 1972 (Zagórski 1976). The results of the survey confirmed the interdependence between migration and socio-occupational mobility. However, it varied among socio-occupational groups and depended on the direction of migration. The impact of migration was stronger when it involved a change in the type of the place of residence (urban-to-rural, rural-to-urban), and it was the strongest in the case of rural-to-urban migration. It is worth emphasizing that the study allowed the impact of migration upon intergenerational and intra-generational mobility considered separately to be revealed.

The relationship between migration and social mobility was also of interest for demographers who tried to find out the consequences of migration for the socio-economic status of migrants. The first attempt was made by the Central Statistical Office in 1974, in the study on causes of internal migration. The study was devoted to changes in the socio-occupational status, i.e. the economic activity, source of income, social group, employment by branches of the national economy, occupational and the socio-occupational group, in the new as compared to the previous place of residence. Hence, an attempt was made to reveal the immediate impact of migration on social mobility. Among the components of socio-occupational status, it was migration that exerted the most powerful impact on the change in membership of a social group. More than every fourth migrant was involved. The remaining determinants of the socio-occupational status involved every 5th or 6th migrant (Witkowski 1979).

The social aspects of migration, including the relationship between migration and social mobility, were exclusively discussed in demographic literature in the 1976–1980 period, particularly in that concerning migration in Pomerania and the Masurian Lake District as well as among persons with a higher education. The analysis indicated that migrants, more frequently than non-migrants, changed their socio-occupational positions, which was beneficial for their professional careers. Hence, migration was considered as a factor accelerating the upward occupational mobility.

Studies of the late 1970s were found interesting, and their results encouraging enough to stimulate their development during the 1980s. Two individual studies are worth mentioning in this review.

The first was an inquiry concerning living conditions and needs of the Polish society, carried out in 1982 by the Institute of Philosophy and Sociology, Polish Academy of Sciences. The analysis covered 2433 households which included 5317 adults. Out of these, 3489 economically active persons were selected for the analysis of social mobility. There were 1396 migrants among them. The socio-economic and demographic structure of the sample were rather similar to that of the total population, which allowed for generalizations. Although the inquiry was not aimed at the study of the relationships between migration and social mobility,

it allowed the authors to define the consequences of migration for the social mobility process. Four types of mobility were considered: occupational (a change in occupation), socio-occupational (a change in the socio-occupational group), educational (a change in the educational level), and intersectoral (a change in the sector of the national economy) (Witkowski 1985). An attempt was also made to define the impact of migration on socio-occupational progress. Namely, earlier changes in place of residence were considered against the current socio-economic status of jobs held by migrants and the wage levels at the time of inquiry (Domański and Witkowski 1989, part 3).

Another study dealing with this problem was conducted in 1983 within the research on household budgets, carried on by the Central Statistical Office. It involved a sample survey of internal migration. Migrants were defined as persons who currently lived at a given place in the 1970–1983 period, and who had been at the age of 15 or over at the time of migration. In the nation-wide sample, those conditions were met by 2065 persons who constituted the base for the analysis of the immediate impact of migration on the socio-economic status of migrants. Six basic indicators of social status were focused on, which defined the position of migrants in the general social structure. These were: the source of income, economic activity, socio-occupational group, and economic sector. An attempt was also made to evaluate the impact of migration on dwelling conditions and various conditions at the place of work (Domański and Witkowski 1989, part 2).

Generally, fairly rich empirical material has been collected in Poland, which is related to the links between migration and social mobility in the postwar period. The remaining part of this paper is devoted to the presentation of basic conclusions resulting from the research conducted during the 1980s.

3. BASIC TERMINOLOGICAL PROBLEMS

The most generally, social mobility means the transition of individuals or groups between positions in the social hierarchy. In Poland, social mobility is the most frequently defined as the process of redistribution of specific attributes among individual categories of the social system (Janicka 1976, p. 7). Therefore, the definition of the social space, in which these movements occur, represents the critical point in the studies of social mobility. The occupational approach to the definition of social space (as a base for the analysis of social differentation) is most common. Hence, for research practice, social mobility denotes translocations of individuals within the occupational structure, or hierarchy (Mach 1982, 31–41). When the determinants of the social position are limited to the attributes connected with work the resulting notion of social mobility becomes too narrow. Undoubtedly, however, the basic amount of social transitions occurs through work. So interpreted, social mobility consists of many kinds of transactions: those between occupations, posts, enterprises, economic sectors, socio-occupational groups, sources of income, etc. Sociological studies of social mobility are most frequently limited to flows between socio-occupational groups. Also the approach followed in the present paper is limited to the evaluation of the impact exerted by migration upon moves among 25 socio-occupational categories (Słomczyński 1979). Our attention is focused on intra-generation social mobility, i.e. flows between socio-occupational groups in the course of the occupational careers of the inquired persons. In accordance with the commonly applied methodology, the moves were indentified by comparing the socio-occupational group of the migrant immediately before his/her change in the place of residence, with his/her socio-occupational group at the time of inquiry.

The adopted definition of social mobility determined the choice of the population which had to consist of persons in the labour force. Those individuals living, after their first entrance to the labour force, for at least one year at a place of residence different from the one found at the time of inquiry, were considered as migrants. The remaining persons, i.e. those who have not changed their places of residence at all, or had done this before their first

employment, were regarded as non-migrants. The differentiation between migrants and non-migrants offered additional possibilities for carrying out a comparative analysis of the process of social mobility in both subpopulations.

4. MIGRATION AND INTRA-GENERATION SOCIAL MOBILITY AS THE MAIN RESEARCH RESULTS

4.1. THE SOCIAL MOBILITY OF MIGRANTS

According to the data already referred to, about 43% of the migrants have changed the membership of social-occupational groups in the course of their occupational activity. Some of the migrants had experienced social mobility before they changed the places of residence, but their number was considerably smaller than that of those who migrated the first time. The comparison between those results and the findings of other studies, according to which every 5th change in the place of residence evoked immediately socio-occupational mobility, allows it to be concluded that at least some migrants find additional possibilities to move within the social structure in the new places of residence.

The coincidence of migration and socio-occupational mobility is shaped differently in various sub-populations. Significant factors include: sex, direction of migration, educational level, socio-economic group in first job, and the period of entry into the labour force. Migration stimulates the social mobility of men to a greater extent than it does in the case of women. Shifts between socio-occupational groups occur the most frequently among persons who change the type of the place of residence and, especially, the urban-to-rural migrants. The lowest mobility is characteristic of migrants with a higher education; this is also true in the case of migrating farmers. It is also important that the progressively younger cohorts of workers experience decreasing social mobility. This observation refers not only to migrants, but it reflects the general regularity of the decreasing social mobility of Polish society.

TABLE 1. Frequencies of the observed, circulation, and structural mobility, as per cent of migrants

Items	Mobility			Circulation / observed × 100
	observed	circulation	structural	
Total	42.5	31.1	11.4	73.2
males	44.4	30.8	13.6	69.4
females	40.3	27.2	13.1	67.5
Direction of migration				
rural to urban	48.9	29.6	19.3	60.5
urban to rural	55.7	22.8	32.9	40.9
urban to urban	41.5	31.2	10.3	75.2
rural to rural	30.8	16.8	14.0	54.5
Period of migration				
1945–1959	51.0	30.3	20.7	59.4
1960–1970	46.3	30.8	15.5	66.5
1971–1982	38.8	28.6	10.2	73.7
Age of migrants				
18–29	42.8	29.2	13.6	68.2
30–39	36.9	25.7	11.2	69.6
40 or over	52.2	26.1	26.1	50.0

Social mobility can lead to permanent changes in the socio-occupational structure if it results from progessive structural transformations following socio-economic development. This fraction of social mobility referred to as structural (or net, forced, technological). The remaining fraction of mobility entails the exchange of employees among different socio--occupational groups only and evokes no changes in the social structure. It is defined as circulation mobility (or pure, exchange, individual). In the study reported on, it was circulation mobility that occurred more frequently among the inquired population of migrants. Only every fourth change in the membership of the socio-occupational group resulted in changes in the social structure of the population, i.e. it meant structural mobility by nature. Circulation mobility was found of greater significance in the case of migration to towns, especially from other towns. Structural mobility accounted for a larger share in the total mobility in the 1950s, and its importance has been systematically declining since that time. Thus, in the early periods of the post-war history of Poland, migration contributed to a larger extent to shifts in the labour demand resulting from the transformations of the national economy. Those shifts were made possible, among other things, by the retraining migrants. With time migration continued to facilitate the accomplishment of the aspirations of migrants, whereas its significance as a factor of the transformation of the socio-occupational structure of the population declined. Hence, the function of migration in the process of social mobility, has changed.

The increasing significance of circulation mobility accompanying migration indicates the considerable exogenousness (openness) of the social structure of Poland. However, more detailed analysis indicated the relatively limited openness of the socio-occupational structure of migrants. This finding results from the fact that transitions of migrants occur most frequently among categories close to each other in the socio-occupational hierarchy. As a result, the main stream of social mobility flows between similar socio-occupational groups. The intelligentsia is the most endogenous (closed) group from this point of view. The lower the position of a category in the occupational hierarchy, the more exogenous it tends to be.

For individual migrants, social mobility may entail either social promotion or degradation. Generally, transitions which are connected with the improvement of social position of migrants are slightly more frequent. Hence, the total result of social mobility is advantageous for migrants.

4.2. SPECIFIC CHARACTER OF THE SOCIAL MOBILITY OF MIGRANTS

The analysis of the association between migration and social mobility does not constitute sufficient grounds for defining the pecularities of the interdependence. It is only a comparison of the course of social mobility of migrants versus non-migrants that allows the *de facto* role of migration in the process of social mobility to be indicated.

On the basis of comparative analysis, one can state that migrants are distinguished by their predominant socio-occupational mobility when compared with persons who did not change their places of residence. This supports the conclusion about the active and stimulating role of migration in the process of social mobility. In other words, migration facilitates transitions between socio-occupational groups.

The specific nature of the social mobility of migrants is also confirmed by the exogenous character of their socio-occupational structure, greater than in the case of non-migrants. Migrants are also characterized by more intensive structural mobility which can be interpreted so that migration facilitates the adaptation of socio-occupational structure to the labour requirements resulting from the socio-economic development. If an additional surface (aspect) of vertical social mobility is introduced, it turns out that migrants have better opportunities for occupational promotion. More detailed analysis indicates that migration tends to accelerate professional promotion. This leads to the conclusion that the patterns of social mobility of migrants and non-migrants are different and those differences are permanent.

Social mobility is conditioned by many factors. Generally, socio-economic conditions are decisive in shaping the patterns of social mobility. The studies indicate that the social status of the first job is of intrinsic significance for the course of the social mobility of an individual.

TABLE 2. Frequencies of observed (total) mobility of migrants

Items	Migrants	Non-migrants
Total	42.6	29.2
males	47.8	32.5
females	38.2	25.6
Period of first employment		
1945–1959	52.5	39.4
1960–1970	43.3	36.6
1971–1982	32.9	21.9
Education level of first job		
elementary non-completed	35.8	18.5
elementary completed	49.9	35.4
basic vocational	40.3	27.3
secondary vocational	45.2	29.3
secondary	44.8	37.5
university	20.9	24.1

The importance of this factor appeared to be of greater consequence in the case of non-migrants rather than migrants. To a greater extent than in the case of non-migrants, the social mobility of migrants depends on factors unrelated to the occupational position of individual occupational groups on the labour market. The position is important as it determines not only the possibilities of changing the place of residence, but also the necessity of occupational transitions coresponding to the requirements of the local labour markets.

5. CONCLUSIONS

The demographic research of the 1980s significantly enriched the prevailing knowledge about the relationship between migration and social mobility. Studies confirmed that migration is frequently accompanied by changes in the social position of migrants. Changes in the place of residence often facilitates the social mobility of individuals. One could even claim that the part of social transition called social mobility is the consequence of changes in the place of residence. This means that migration should be treated as one factor stimulating social mobility.

Social transitions of migrants have, in majority, the character of circulation mobility, hence they cause no changes in the population structure. From this point of view, the current migration in Poland is of limited effectiveness. It should be stressed, however, that transformations of the social structure of the population are connected with a given concept of socio-economic development, the implemented social policy. In this sense, migration is only an instrument of general socio-economic policy, the mediating factor of changes in the social structure.

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THE REGIONAL STRUCTURE OF THE STANDARD OF LIVING IN POLAND

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1. INTRODUCTION

The standard of living has attracted much attention of Polish researchers in recent years. This may be attributed to the worsening economic and ecological situation of the country and the deterioration of the living conditions. These are the domain of various studies, including those on the standard of living and ways of measuring it as undertaken by socio-economic geographers.

The notion of the standard of living is rather difficult to define because of its normative character and relativization to a specified social system under which various individual needs develop and evolve. Individual scholars employ their own definitions; hence, the standard of living has become an ambiguous notion. In Polish social geography, apart from the standard of living, other terms are used, e.g. social welfare, living conditions, the life style, the way of life, the quality of life. Some of these notions are similar, others overlap, still others differ significantly.

Since the adoption of a given conception of the standard of living is of cardinal importance for its measurement and determines the comparability of cognitive results, further attempts are made to introduce order into the terminology and to develop a concept in question.

The results obtained thus far seem to suggest the following:

(1) The standard of living is the actual state of satisfaction of human needs rather than a collection of aspirations generally accepted in a given community.

(2) The essential elements of the standard of living include a specified level of satisfaction not only of existential needs, viz. feeding, clothing, residential, material services, health, recreational and ecological, but also those whose satisfaction is necessary for the development of human personality, viz. education, upbringing and care, as well as social needs, i.e. the reception of culture, participation, approval, gratification, and keeping in touch. This formulation assumes that the standard of living is not identical with the set of material conditions experienced by an individual or a social group in a given social system. The weight, or even the very consideration, of particular components and the determination of their content in an empirical analysis depends, however, on the spatial scale and the character of the social system.

(3) The standard of living is determined by a number of both external and internal factors. The external factors cover the impact of the surroundings. The internal ones operate at the onset of the process of the formation of the standard of living by modifying the kind of human needs, while external ones determine the satisfaction of already defined needs. Thus, external factors are the principal determinants of the standard of living. In other words, the

variable properties of man constituting a standard of living are associated, i.e. have relations, with specific external factors. The relations are interpreted in terms of determination and are important for the understanding of the mechanism of the formation of the standard of living. This mechanism is complicated and rests on relations corresponding to bidirectional interactions. One direction of interaction is when specific events in man's environment (external factors) ensure the fulfilment of specific needs and shape the standard of living. According to some scholars, these are dependences between outlays (means) and social effects. The other direction of interaction is in the ongoing process of the formation of the standard of living when, after a certain level of need satisfaction has been attained, there may occur a change in the kind of some needs or new needs may arise, and in this way a specific standard of living will result in a change in the environment. This approach to the research rests on two notions, well founded in Polish social geography: living conditions and the standard of living, and justifies their joint treatment. The combination of living conditions and the standard of living into one category underlies empirical studies carried out in this field.

The investigation of the standard of living is conducted in two dimensions: individual and aggregate. In the individual dimension, the research aims at the determination of the standard of living of a population through interviews or questionnaire inquiries concerning the level of need satisfaction. Whatever the definition of a need, this kind of research is subjective-evaluative because it relies on an individual's values against which he (she) measures the level of the satisfaction of his (her) needs.

In the aggregate dimension, the research seeks to find overall and partial measures of the standard of living in terms of flows of commodities and services as well as conditions of the environment. These measures can be expressed in terms of either monetary or non-monetary value, in which case they are natural.

Monetary-value measures are magnitudes of various types expressed in terms of prices. The most important measure of this kind is variously defined national income. It is considered to be the principal measure characterizing not only economic development, but also the level of prosperity. In spite of the positive correlation between an increase in national income and in prosperity, its use in defining the standard of living has been questioned (cf. Zienkowski 1979: 25–26). This is done on the grounds that the standard of living is not determined merely by the quantity of consumed and accumulated goods and services, but also by their quality and the socio-economic and ecological conditions in which a person lives. At the same time, it is impossible to distinguish clearly between the standard of living and the quality of life.

Under the Polish conditions, in the 1980s an additional important factor limiting the validity of national income as a measure of the standard of living was the fact that in an economics of shortage monetary-value measures were inadequate exponents of the exchange of goods and services on the market, because money was not a sufficient means of acquiring specific goods and services.

Non-monetary-value measures, which can be conventionally called natural, are magnitudes of various types expressed in physical units and embracing not only goods and services, but also ecological conditions, i.e. certain states of the environment and people (socio-demographic states). However, these measures concerning specific properties are partial, and attempts at their aggregation, although possible (e.g. in the framework of factor analysis), lead to significant information loss resulting from the reduction of their multidimensionality (cf. Chojnicki, Czyż 1987).

Attempts at investigating the standard of living in the aggregate approach have proved that the use of either group of measures leads to one-sided results. Hence, in the present study an attempt is made to apply them jointly and to define their mutual relations.

Another important matter in the study of the standard of living, besides its measurement, is its evaluative interpretation. Although the present study focuses primarily on the question of how to establish the actual state of affairs, i.e. on description, it is impossible to avoid evaluative elements. These can assume various characters and can be introduced in various ways.

In the conception of social development it is assumed that an increase in income, as well as in the production and consumption of goods and services is positive, while their decrease is negative. It is the other way around with the evaluation of those measures the increase of which is the indication of a deteriorating standard of living, e.g. an increase in the time of waiting for a flat, or an increase in mortality. Thus, the measures indicating a standard of living are divided into positive and negative.

Also the spatial, or regional, differences in the standard of living are subject to evaluation based on the concept of spatial equity. The justification of this egalitarian conception rests on various premises. Some authors derive it from the principles of social justice, others from pragmatically understood advantages of even development. It should be noted that while the conception of equity is treated normatively as a goal of socio-economic development, spatial differences in the standard of living belong to the major factors controlling social mobility (migrations) as well as the development of industry and urbanization.

2. RESEARCH APPROACHES

The aim of this study is to determine the standard and conditions of living of the population in the regional system of Poland. Three closely related approaches to the study of this problem have been employed. This strategy allows not only the comparison of results, but also their joint interpretation.

In the first approach, the adopted measure of the standard and conditions of living in a region is the volume of goods and service consumption, both those bought with personal incomes and those received free from social funds. The private consumption is the principal part of income distributed. However, the use of this regional index is debatable. Two issues are raised in the debate. First, the index of the consumption of material goods and non-material services from personal incomes is an aggregate one, and two regions with identical incomes may differ widely as to the adaptation of their structures of consumption to people's needs. Secondly, regional income is an estimated value, and the consumption in a region is not exactly the consumption by the regional population. This is due to inter-regional transfers of goods and non-material services. In order to check if global consumption as part of the national income distributed assigned to the given region is an adequate measure of the standard of living, one should pass on to the analysis of partial indices of the standard and conditions of living in the regions. These more concrete indices are supposed to have a supplementary or corrective role with respect to the previous, synthetic description of the standard of living.

The second approach rests on the recognition of the set of properties defining the standard of living in terms of positive phenomena, i.e. desirable in the social development of a region. Partial indices relevant in the regional system under study describe the empirical pattern of a multidimensional standard of living. The indices measure its various aspects and are assigned to particular components of this standard. The following components are distinguished: (1) service accessibility, (2) housing, (3) health care, (4) education, (5) culture, and (6) income surplus. For these six components, a set of 18 regional indices is prepared (see Table 1). Due to the incompleteness of the regional data published in the Polish official statistics, which were the only source of information available, the set of indices and components is not complete, either. Without going into the details of index selection, it should be stated that the ones taken into consideration were predominantly those describing the level of satisfaction of existential needs. No indices of social properties were introduced into the analysis owing to the impossibility of obtaining those data for the whole regional system of Poland.

A comparison of results obtained in the two approaches is supposed to answer the question of whether regional income considered in terms of consumption is a significant socio-economic magnitude determining the satisfaction of a person's needs.

TABLE 1. Positive indices of the standard of living

No.	Indices
1	Total floorspace of retail outlets in socialized market trade per 1000 population (m^2)
2	Sale of services to individuals per capita
3	Habitable rooms completed per 1000 population
4	Percent of urban population supplied with water installations
5	Percent of urban dwellings with bathrooms
6	Electric power consumption in urban households per consumer (in kWh)
7	Electric power consumption in rural households per consumer (in kWh)
8	Physicians per 10 000 population
9	Beds in general hospitals per 10 000 population
10	Pupils of vocational schools per 1000 population
11	Students of general secondary schools per 1000 population
12	Sales of newspapers and periodicals per inhabitant (in copies)
13	Seats in stationary cinemas per 1000 population
14	TV sets per 1000 population
15	Retail sale of goods in socialized shops per inhabitant (in thousand zl.)
16	Privately owned cars per 1000 population
17	Telephones per 1000 population
18	Savings deposits in the Polish Savings Bank (PKO) and co-operative banks per inhabitant

Sources: *Rocznik Statystyczny* (Statistical Yearbook), GUS 1987, *Rocznik Statystyczny Województw* (Statistical Yearbook of Voivodships), GUS 1987, *Rocznik Demograficzny* (Demographic Yearbook), GUS 1987.

In this connection, other questions also arise: What are the relations in a region between the level of welfare as defined by the volume of consumption and other indices of the standard of living pertaining to the social and economic state of the region (the population and infrastructure)? Will various configurations of partial indices correspond to the same regional income in terms of consumption?

The third approach makes use of indices of undesirable phenomena that are symptoms of negative social, economic and ecological phenomena in particular regions. They make up a set of six variables and give information on housing problems, mortality, and the quality of the environment (Table 2). The set includes indices of negative phenomena which are symptomatic of irregularities in development (e.g. long time of waiting for a flat) or which are an undesirable side-effect of development (e.g. air pollution related to industrial development). Methodologically, the difference between desirable and undesirable phenomena

TABLE 2. Negative indices of the standard of living

No.	Indices
1	Members of housing co-operatives waiting for dwellings per 1000 population
2	Infant mortality per 1000 live births
3	Deaths from cancer per 1000 population
4	Deaths from circulatory diseases per 1000 population
5	Emission of dusts and gases per km^2 (in tons)
6	Industrial and communal waste requiring treatment and discharged into surface waters per km^2 (in dam^3)

Sources: *Rocznik Statystyczny* (Statistical Yearbook), GUS 1987, *Rocznik Statystyczny Województw* (Statistical Yearbook of Voivodships), GUS 1987, *Rocznik Demograficzny* (Demographic Yearbook), GUS 1987.

consists in the fact that with the latter, all values greater than zero mean a situation unfavourable for the standard of living (e.g. even slight air pollution). Indices of desirable phenomena, in turn, require an arbitrary boundary to be drawn between a favourable and an unfavourable value from the point of view of the standard of living (e.g. the index of 10 physicians per 10 000 population may be taken to indicate a low standard of living). The comparison of the positive and negative indices adopted in the second and third approaches changes the ordering of the regions on the scale of the standard of living. The final comparison of the results will provide an answer to the question of whether or not regions with the highest consumption indices have the highest indices of desirable phenomena and the lowest indices of socially undesirable ones, determining the standard of living of the resident population. The study concerns the year 1986, i.e. a period of crisis-related phenomena in the economy and living conditions in Poland, and is carried out for 49 voivodships.

3. THE STANDARD OF LIVING IN TERMS OF INCOME DISTRIBUTED

Per capita income distributed (consumed) in a region is thought to be the best of the existing summary measures of the satisfaction of people's needs. In 1986, Poland's national income distributed (= gross domestic product, GDP) amounted to 12 835 000 000 000 zl. (at current prices). Total consumption took up 71%, of which 53% from personal incomes and 9% from social funds; accumulation amounted to 29%, of which 22% investment outlays on fixed assets. The shares of particular voivodships in income distributed varied from 11.8% (Katowice) to 0.7% (Biała Podlaska, Ostrołęka). *Per capita* regional income distributed varied between 568 000 zlotys (Warsaw) and 238 000 zlotys (Siedlce).

The aggregate character of income distributed is considered to be a great advantage of this measure, because it yields itself to analysis both in this summary form and when disaggregated into particular components. What is considered in the analysis of the standard of living, is income distributed in its part allocated to total private consumption. The latter includes direct consumption of goods and services, both those bought with personal incomes and those obtained free from social funds. As mentioned above, total private consumption accounts for 62% of national income distributed.[1]

Before we pass on to a detailed analysis of the standard of living by regions on the basis of total private consumption, let us remark on the relations between the distributions of the indices of consumption from personal incomes and consumption from social funds, and then on the relation between the indices of consumption and income distributed.

Private consumption from social funds (9% of national income distributed) has a similar spatial variation as consumption from personal incomes (53% of national income distributed). Voivodships with a higher index of consumption from personal incomes have a proportionally higher index of consumption from social funds (the correlation coefficient of these regional indices is 0.77; cf. Fig. 1). Naturally, there are deviations from this regularity in some voivodships, resulting from differences in the degree of concentration of institutions offering social services, such as health care, education and culture. This group of voivodships includes: Bielsko-Biała, Nowy Sącz, and Bydgoszcz (with a "deficit" of *per capita* consumption from social funds in relation to *per capita* consumption from personal incomes), Lublin and Olsztyn with a high consumption from social funds in relation to consumption from personal incomes. The class of average indices of regional consumption from social funds (12 voivodships) is smaller than that of indices of consumption from personal incomes (19 voivodships).

The ranking of voivodships on the scale of *per capita* consumption corresponds closely to their ordering on the scale of regional income distributed (the correlation coefficient of these

[1] The remaining components of national income distributed are national consumption and accumulation.

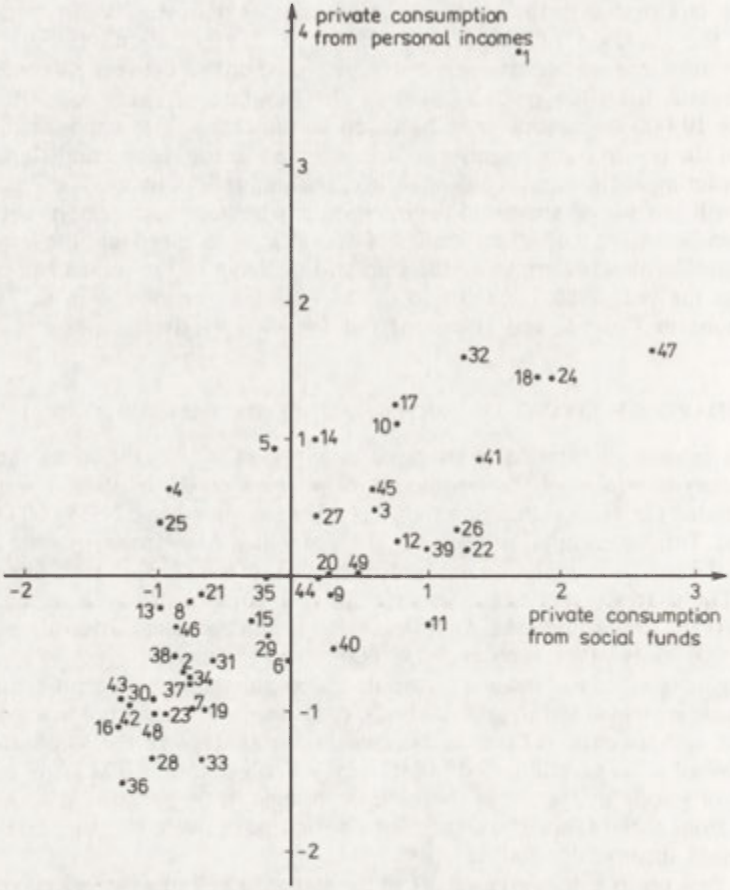


Fig. 1. Relations between the distribution of the index of consumption from personal incomes and the distribution of the index of consumption from social funds

1 — Warsaw, 2 — Biała Podlaska, 3 — Białystok, 4 — Bielsko-Biała, 5 — Bydgoszcz, 6 — Chełm, 7 — Ciechanów, 8 — Częstochowa, 9 — Elbląg, 10 — Gdańsk, 11 — Gorzów, 12 — Jelenia Góra, 13 — Kalisz, 14 — Katowice, 15 — Kielce, 16 — Konin, 17 — Koszalin, 18 — Cracow, 19 — Krosno, 20 — Legnica, 21 — Leszno, 22 — Lublin, 23 — Łomża, 24 — Łódź, 25 — Nowy Sącz, 26 — Olsztyn, 27 — Opole, 28 — Ostrołęka, 29 — Piła, 30 — Piotrków, 31 — Płock, 32 — Poznań, 33 — Przemyśl, 34 — Radom, 35 — Rzeszów, 36 — Siedlce, 37 — Sieradz, 38 — Skierniewice, 39 — Słupsk, 40 — Suwałki, 41 — Szczecin, 42 — Tarnobrzeg, 43 — Tarnów, 44 — Toruń, 45 — Wałbrzych, 46 — Włocławek, 47 — Wrocław, 48 — Zamość, 49 — Zielona Góra

indices equals 0.92). There are, however, some shifts in the positions of voivodships with a large share in national investment outlays on fixed assets: the Piotrków (open-cast brown coal mines and power station), and Legnica (copper mines and copper-works) voivodships, as well as those with a small share (below the national average), i.e. the Częstochowa and Nowy Sącz voivodships. Seven voivodships lead in the ranking of *per capita* regional indices of consumption, i.e. the Warsaw, Wrocław, Poznań, Łódź, Cracow, Koszalin and Gdańsk voivodships (315 000 to 230 000 zlotys; see Table 3 and Fig. 2). With the exception of

Fig. 2. Regional indices of consumption per inhabitant

the Koszalin voivodship, these are urban regions the cores of which are large urban agglomerations. The next class, with high values of the index, is also composed of voivodships with major urban agglomerations (Szczecin, Katowice and Bydgoszcz); of those with smaller urban agglomerations (Wałbrzych and Białystok); and of one with a potential urban agglomeration: Olsztyn (230 000 to 210 000 zlotys).[2]

Seventeen voivodships have low and very low levels of consumption (180 000 to 140 000 zlotys). These are the central voivodships surrounding Łódź and Warsaw, the eastern voivodships (Łomża, Biała Podlaska and Chełm), and the south-eastern voivodships (Tarnobrzeg, Zamość, Tarnów, Przemyśl and Krosno; see Table 3 and Fig. 2). There are average regional indices of consumption (210 000 to 180 000 zlotys) in 19 voivodships of the northern, western and southern parts of Poland.

In the pattern of regional differences in consumption indices, there is a clear division of Poland into the western and northern part with an average consumption level, and the central and eastern part with a low level. Scattered throughout the country are individual voivodships with high or average consumption indices containing large or medium-sized urban agglomerations. In south-eastern Poland, these are the Kielce, Lublin and Rzeszów voivodships with average indices of regional consumption. The strongest contrast in the level of consumption can be observed between the highly urbanized Łódź and Warsaw voivodships and the neighbouring rural-agricultural ones.

There is also a close relationship between regional consumption indices, on the one hand, and the economic functions and the level of urbanization of the voivodships, on the other.[3]

[2] Regional indices are standardized and divided into five classes: above 1 – very high; +1 to +0.5 – high; +0.5 to −0.5 – average; −0.5 to −1 – low; and below −1 – very low.

[3] The economic functions of voivodships were determined on the basis of the structure of income

TABLE 3. Regional indices of consumption per inhabitant*

Voivodship	Consumption per inh. (,000 zl)	Voivodship	Consumption per inh. (,000 zl)
1. Warsaw	315	26. Leszno	187
2. Wrocław	258	27. Częstochowa	186
3. Poznań	249	28. Kielce	184
4. Łódź	248	29. Kalisz	183
5. Cracow	247	30. Piła	183
6. Koszalin	236	31. Suwałki	183
7. Gdańsk	232	32. Włocławek	180
8. Szczecin	228	33. Chełm	177
9. Katowice	225	34. Płock	175
10. Bydgoszcz	221	35. Skierniewice	175
11. Wałbrzych	217	36. Biała Podlaska	171
12. Białystok	212	37. Radom	170
13. Olsztyn	212	38. Sieradz	169
14. Opole	209	39. Piotrków	164
15. Bielsko Biała	209	40. Krosno	164
16. Lublin	208	41. Ciechanów	163
17. Słupsk	208	42. Tarnów	163
18. Jelenia Góra	207	43. Tarnobrzeg	162
19. Nowy Sącz	202	44. Zamość	162
20. Zielona Góra	199	45. Łomża	161
21. Legnica	198	46. Konin	156
22. Toruń	195	47. Przemyśl	153
23. Rzeszów	193	48. Ostrołęka	152
24. Elbląg	193	49. Siedlce	145
25. Gorzów	191		

*Total private consumption is the sum of two components of income distributed (GDP): "private consumption from personal incomes" and "private consumption from social funds".

Source: *Dochód narodowy Polski wg województw w 1986 r.* (Poland's 1986 national income by voivodships), Zakład Badań Statystyczno-Ekonomicznych GUS and Polska Akademia Nauk, Warszawa 1989.

The class of the highest consumption level is composed of highly industrialized and urbanized voivodships: Warsaw, Wrocław, Poznań, Łódź, Cracow and Gdańsk; the Poznań and Wrocław voivodships are also very well developed agriculturally. The Koszalin voivodship, with the dominant agricultural function and an average level of urbanization, is an exception. The class of the high level of consumption includes the Katowice, Szczecin and Wałbrzych voivodships, highly urbanized and highly (Katowice) or moderately (Wałbrzych, Szczecin) industrialized, as well as three voivodships: Białystok and Bydgoszcz at an average, and Olsztyn at a low level of industrialization and an average level of urbanization.

To the class of an average consumption level belong voivodships differing in their economic character and the level of urbanization. They are either at an average urbanization level and (a) highly industrialized (Bielsko-Biała, Częstochowa, Legnica, Jelenia Góra, Zielona Góra), (b) industrial-agricultural (Opole, Lublin, Toruń, Słupsk, Elbląg, Gorzów Wielkopolski), (c) agricultural (Piła, Suwałki) or they are at a low urbanization level and (d) industrialized (Rzeszów), (e) industrial-agricultural (Kielce, Kalisz), (f) agricultural (Leszno, Włocławek, Nowy Sącz).

generated by sectors of the national economy. The percentage of urban population was taken as the measure of the urbanization level.

In the class of low and very low consumption, weak agricultural-rural regions prevail. These are the Biała Podlaska, Sieradz, Ciechanów, Zamość, Łomża, Przemyśl, Ostrołęka, Siedlce, Chełm and Skierniewice voivodships. This class also includes new industrial regions with rural agricultural traditions (Płock, Piotrków, Tarnobrzeg), and regions with poor agriculture, relative dominance of industry, and poorly urbanized (Konin, Radom, Krosno and Tarnów).

The above pattern reveals a clear regularity in the regional system of Poland: the higher the industrialization and urbanization of a region, the higher is its level of private consumption. In the case of a marked disparity between the urbanization and industrialization levels, voivodships move up or down the scale of consumption.

The following cases are worth noting:
(1) the Koszalin voivodship, characterized by an average level of urbanization, with poor industrialization, and belonging to the class of high consumption indices; (2) the Bielsko-Biała and Legnica voivodships, highly industrialized and moderately urbanized, belong to the class of average regional consumption; (3) the Płock voivodship, poorly urbanized with relation to its high industrialization, belongs to the low consumption class; (4) the Rzeszów voivodship, with average industrialization and poor urbanization, and included in the average consumption class; (5) the agricultural Suwałki voivodship with average urbanization, and the Leszno and Nowy Sącz voivodships with a low urbanization level, with their consumption indices boosted to average by strong tourist and recreation functions (Nowy Sącz and Suwałki) or a high level of agricultural production (Leszno).

It is also worth noting that the dominance of industrialization over urbanization can lead to a shift of regions either up or down the scale of consumption, while a relative dominance of urbanization over industrialization is as a rule accompanied by an increase in the position of a region on this scale.

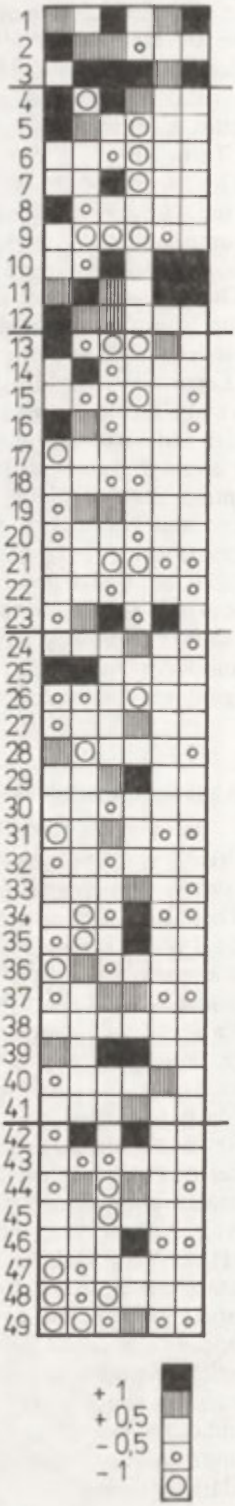
4. PARTIAL INDICES OF THE STANDARD OF LIVING

Private consumption as part of the GDP remains an aggregate index, and as such it does not provide much information essential to the evaluation of the standard of living.

There may also appear errors in the interpretation of the indices of consumption in the regional pattern, resulting from the method of disaggregating or, more precisely, estimating income distributed by voivodships. This justifies the use of partial indices to describe particular aspects of the standard of living. In empirical studies, it is necessary to provide not only a synthetic index, but also a whole system of measures characterizing the standard of living, which ensures more detailed information.

In this part of the study, a multi-index analysis of the standard of living in the regional approach is carried out parallel to the evaluation of this level using income distributed.

Regional indices of the level of living comprise two sets. The first, basic one, is composed of indices of positive phenomena, i.e. those defining a high standard of living, assigned to its particular components (aspects). Eighteen such indices have been adopted, related to: accessibility to services (variables 1–2), housing (3–7), health care (8–9), the level of education (10–11), cultural facilities (12–14), affluence (15–18; see Table 1). This list includes indices of the standard of living commonly used in Poland, and is incomplete owing to the lack of statistical data broken down by regions. Without entering into a discussion on the criteria of the selection of social indices, let us focus on the reasoning followed in the evaluation of the statistical representativeness of the indices used. They have different contents and give information about quite different phenomena. It is assumed that a strong correlation between the indices suggests that these phenomena represent a certain pattern of regional development common to most regions, and hence the set of indices can be taken as representative of the standard of living.



An essential element of the research procedure is the establishment of the pattern of the real standard of living in a region. This multidimensional pattern is built on the basis of the set of 18 regional indices observed. By comparison with average regional values of the indices, classes of regions relating to the standard of living are built.[4] Since each region is described by a different combination of the classes of values of the 18 indices, the classification of the regions rests on the generalized characteristic of the frequency of particular classes of these indices. The prevalence of indices with very high, high, average, low, or very low values allows a given region to be included in the appropriate class of the standard of living (see Fig. 3). The Perkal index (the sum of standardized values of indices defined for each region) is used as an additional criterion of the ordering of regions on the scale of the standard of living. The results of the regional classification using the above criteria are as follows.

Regions of particular classes are characterized by high values of the selected partial indices. For regions with the very high standard of living these are: the sale of services (variable 2), the consumption of electric energy in the rural areas (7), physicians (8), hospital beds (9), students of general secondary schools (11), sales of newspapers (12), TV sets (14), retail sale of goods (15), telephone subscribers (17), privately owned cars (16), savings deposits (18). In the class of a high standard of living, most regions have only six indices with high values (8, 9, 12, 14, 15, 17). Among regions with a very low standard of living, there are even five with a high value of the index of "habitable rooms completed" (variable 3). It may be interesting to note at this point that the three regions with a very high standard of living have a low value of this index. Regions with a very low standard of living have low values of the following indices: floorspace of retail outlets (variable 1), the sale of services (2), hospital beds (9), retail sale of goods (15).

The second set contains indices of negative phenomena, i.e. ones that bring down the standard of living and result from irregularities in regional development or that are undesirable side-effects of this development. It is impossible to characterize the standard of living without appraising such undesirable results and their impact on living conditions.

The choice of indices of negative phenomena observed in the regions encounters serious difficulties due to the lack of statistical information. Hence, the study was limited to six indices of negative phenomena observed in the regions in the fields of housing (variable 1), health status of the population (2–4), the natural environment (5–6; see Table 2).

There is a large deficit of flats which creates a strong pressure for dwellings, measured as the number of members of housing co-operatives waiting for flats per 1000 population. The housing pressure is stronger in voivodships with large urban agglomerations and weaker in rural regions, where the housing problem is often even worse. The lagging of residential construction behind growing needs in large agglomerations can be attributed to the wrong organization of construction, monopolized by ineffective housing co-operatives, and to the hampering of individual initiatives. The slower population growth in rural regions, resulting from out-migration, together with the development of private construction in the country (e.g.

Fig. 3. The distribution of partial positive indices of the standard of living
1 – Warsaw, 2 – Wrocław, 3 – Łódź, 4 – Poznań, 5 – Szczecin, 6 – Koszalin, 7 – Gdańsk, 8 – Lublin, 9 – Olsztyn, 10 – Cracow, 11 – Katowice, 12 – Bydgoszcz, 13 – Legnica, 14 – Opole, 15 – Słupsk, 16 – Białystok, 17 – Wałbrzych, 18 – Gorzów, 19 – Toruń, 20 – Zielona Góra, 21 – Suwałki, 22 – Piła, 23 – Jelenia Góra, 24 – Leszno, 25 – Płock, 26 – Elbląg, 27 – Kalisz, 28 – Chełm, 29 – Sieradz, 30 – Rzeszów, 31 – Ciechanów, 32 – Bielsko-Biała, 33 – Kielce, 34 – Zamość, 35 – Skierniewice, 36 – Nowy Sącz, 37 – Biała Podlaska, 38 – Włocławek, 39 – Częstochowa, 40 – Konin, 41 – Radom, 42 – Piotrków Trybunalski, 43 – Tarnobrzeg, 44 – Łomża, 45 – Krosno, 46 – Przemyśl, 47 – Tarnów, 48 – Ostrołęka, 49 – Siedlce

Fig. 4. The distribution of partial negative indices of the standard of living; 1–49 – cf Table 3

[4] Partial indices are standardized and divided into five classes: cf. footnote 2.

in the south-eastern regions, where houses are built often at the cost of limited current consumption, or with money earned abroad) relieve the housing pressure.

When evaluating the health-care system in Poland, it must be argued that the state of health service, especially its infrastructure and effectiveness, is poor. Also, the environmental conditions affecting human health are not satisfactory (there are zones of ecological disaster). This has led to the deterioration of the health status of the population. The negative symptoms of health conditions are high infant mortality and a high frequency of deaths from cancer and circulatory diseases. The worst situation, as far as infant mortality is concerned, is in the Łódź, Katowice, Opole, Płock and Piotrków voivodships; deaths from cancer are most frequent in the Warsaw, Poznań, Cracow, Łódź, Gdańsk, Jelenia Góra, Katowice and Częstochowa voivodships, while from circulatory diseases in the Łódź, Częstochowa, Skierniewice, Sieradz, Piotrków, Zamość and Przemyśl voivodships.

Generally, one may conclude that high mortality rates occur mainly in three kinds of regions: (1) those highly urbanized and industrialized in spite of a relatively good accessibility

TABLE 4. Multidimensional classification

Standard of living	Sharp conflicts	Moderate conflicts	Slight conflicts
Very high	Warsaw Łódź	Wrocław	
High	Cracow Katowice	Poznań Szczecin Koszalin Gdańsk Lublin Bydgoszcz	Olsztyn
Average	Legnica Jelenia Góra	Opole Wałbrzych Gorzów Toruń Zielona Góra	Słupsk Białystok Suwałki Piła
Low	Konin	Płock Elbląg Kalisz Sieradz Rzeszów Bielsko Biała Kielce Skierniewice Nowy Sącz Włocławek Częstochowa Radom	Leszno Chełm Ciechanów Zamość Biała Podlaska
Very low		Piotrków Tarnobrzeg Krosno Tarnów Ostrołęka	Łomża Przemyśl Siedlce

to medical services, e.g. Łódź; (2) industrial regions with insufficient health-care service, e.g. Piotrków and Częstochowa; and (3) weak agricultural regions with underdeveloped health--care service, e.g. Zamość, Przemyśl and Sieradz.

The principal regional threats to human health in urban agglomerations and industrial areas come from environmental degradation. The most noxious is air and water pollution. The highest indices of dust and gas emission, as well as industrial and communal waste discharge, are recorded in regions with large urban agglomerations: Katowice, Łódź, Warsaw and Cracow; the highest air pollution indices are also observed in the industrial regions of Jelenia Góra, Legnica and Konin. The detrimental effect of the deteriorated environment on human health in urban agglomerations is not offset by better medical services in these regions (a larger number of physicians and hospital beds). There is a statistically significant positive correlation in the regional pattern between the level of water pollution and infant mortality and deaths from cancer. The social significance of undesirable phenomena varies widely. The most dangerous is the kind of environmental pollution resulting directly in people's poor health.

The set of six indices of socially negative phenomena that are inherent features of regional development in Poland is a system weakening the effect of the positive factors on the standard of living in a region. The system can be treated as a complex of undesirable phenomena in clear conflict with the formation of a high standard of living.

Considering the seriousness of threats to the natural environment, sharp-conflict regions are taken to be those with very high intensity of dust and gas emission and/or relatively high water pollution. These are the Warsaw, Cracow, Łódź, Katowice, Jelenia Góra, Legnica and Konin voivodships. Two of the seven have simultaneously the largest number of high indices of undesirable phenomena at the regional scale: Katowice 5 and Łódź 5, with recurrent high infant mortality and high mortality from cancer (Fig. 4). The slight-conflict regions include those in which at least one index of environmental degradation is low and another average or low, and the whole set has predominantly low and average indices. By this criterion, there are 13 units in this class: Siedlce, Przemyśl, Łomża, Zamość, Ciechanów, Biała Podlaska, Chełm, Suwałki, Piła, Leszno, Słupsk, Olsztyn and Białystok. In these regions, in the conditions of relatively low environmental pollution, the undesirable phenomena of high intensity are mostly deaths from circulatory diseases (in Siedlce, Łomża, Biała Podlaska, Zamość, Przemyśl and Leszno voivodships). In the remaining 29 moderate-conflict regions with average environmental degradation the conflict is usually between the standard of living, and high mortality and difficult housing conditions.

In order to relate the results of the analysis of the set of partial indices of the standard of living to the results of the analysis of the set of phenomena decreasing this standard, the classification of regions by the strength of environmental conflict is superimposed on the classification according to the standard of living; in this way, a multidimensional classification is produced (see Table 4). It follows from this classification that conflicts tend to grow with the standard of living rising above average. Since the standard of living in Poland is a function of urbanization and industrialization, sharp- and moderate-conflict regions tend to be situated in southern, western, northern and central Poland. They mainly contain urban agglomerations and industrial districts. Out of highly and moderately developed regions, only the Olsztyn, Białystok, Suwałki, Słupsk and Piła voivodships are characterized by a relatively low intensity of undesirable phenomena. In regions with low and very low standards of living, the conflicts usually focus on social problems, but if there is the extractive industry or an industry regarded as objectionable, conflicts with the natural environment emerge (as in Piotrków, Tarnobrzeg, Tarnów, Ostrołęka).

5. A COMPARISON OF THE CLASSIFICATIONS OF REGIONS ON THE SCALE OF THE STANDARD OF LIVING

In comparison with classification A by private consumption (Fig. 2), classification B based on partial indices (Fig. 5) shows the degradation of 18 and the advance of 3 voivodships on the scale of the standard of living. The decrease in the position involves a drop in the standard of living by one class. The most numerous shifts are from class A of an average standard of living to class B of a low standard. Another difference is that classification B has a larger class of a high standard of living at the cost of the class of a very high standard of living, and a larger class of a low standard at the cost of that of an average standard. The size distribution of the classes is more asymmetric. In classification B, the number of voivodships with very high and high standards of living (12) is less than a half of the number of voivodships with low and very low standards (26); in classification A, the latter number is greater only 1.5 times. It is worth noting that the regions that have moved down the scale of the standard of living are mostly the areas of environmental conflicts.

The results of this study seem to support the claim that the definition of the standard of living using the index of income distributed by regions produces an overestimation, both for strong and weak regions. Strong, highly urbanized regions intercept the incomes of inhabitants of other regions suffering from service underdevelopment. Some weak regions with well developed tourist and recreation functions have, in turn, relatively high indices of income consumption which result not from a high consumption level of residents, but from the inflow of tourists. It should also be noted that high and very high standards of living prevail in old voivodships, while low and very low standards in new ones. The "old" voivodships form the

Fig. 5. The classification of voivodships on the basis of partial positive indices of the standard of living
I – very low, II – low, III – average, IV – high, V – very high

cores of the pre-1975 voivodships whose centres are urban agglomerations; the "new" voivodships were formed from the peripheries of the "old" ones. This contrast between the old and the new voivodships is even more pronounced in the classification based on partial indices. It turns out that even those few new voivodships with an average income distributed, located near strong urban regions, have an even lower standard of living by partial indices than their income distributed suggests. The Nowy Sącz, Elbląg, Leszno, Częstochowa, Kalisz, Włocławek, Krosno, Piotrków and Tarnów voivodships go down on the scale of the standard of living due to their poor infrastructural facilities (hospitals, schools, shops), and their communities do not show signs of affluence (cars, savings). The Piotrków voivodship, despite its intensive industrial development, is even assigned to the class of a very low standard of living due to its lagging urbanization.

6. CONCLUSIONS

The spatial structure of the standard of living in Poland is characterized by considerable differences which can be observed: (1) at the national scale – between the western and eastern parts; (2) at the interregional scale – between urban regions whose cores are large urban agglomerations and their neighbouring regions; (3) at the regional scale – between urban and rural areas (cf. Chojnicki, Czyż 1991). The occurrence of these differences is a result of the low efficiency of the regional policy pursued in Poland so far.

The division of Poland with respect to the level of development into the western and eastern parts is conditioned by historical factors; it dates back to the 19th century and is the result of differences in the development of the Polish territories in 3 partitions. The fact that these contrasts have not been reduced over the last 40 years should be blamed on a rather passive regional policy. It proves that the efforts to stimulate economic activity in the backward areas, based mainly on the development of industry, were insufficient and produced small effects in reducing the differences.

Thus, the equalization of the standard of living between the western and eastern parts of Poland remains an issue of the regional policy. Development should be stimulated not only by industry but also, and perhaps primarily, by highly efficient and modernized agriculture associated with agricultural processing industry, by crafts and specialized services, e.g. tourist services. It should be stressed, however, that a rational strategy of the equalization of the standard of living implies a functional and ecological diversity, and hence precludes interregional uniformity.

The development of individual regions should accommodate their different natural, economic and social conditions, and should be based on criteria of regional efficiency. Further processes of the levelling out of disparities in the development of Poland ensuring the adaptation of the space economy to the natural conditions should lead to the formation of three main horizontal economic zones (southern, central and northern) of a high-quality economy and equal standards of living (Dziewoński, Malisz 1978).

The contrasts between regions with large urban agglomerations and the neighbouring regions have appeared as a result of the policy of the excessive development of the agglomerations and the underdevelopment of other components of the settlement system. The development of the urban economy connected with the concentration of the population, employment and production in big cities was accompanied by a lag in urbanization in the neighbouring voivodships caused, among other things, by the insufficient development of the technical and social infrastructures and trade in those voivodships. In 1975, peripheral areas of the agglomerations obtained the status of new voivodships, and this fact gave them an impulse to development. However, it manifested itself largely in a dynamic development of voivodship centres. When planning their development, the various resources of the peripheral regions were not properly utilized.

There are marked urban-rural differences within individual regions. They result from the underestimating of the role of agriculture in socio-economic development and in promoting economic efficiency and a high standard of living in a region. The bad agrarian policy and the underdevelopment of the technical, social and commercial infrastructures hampered the socio-economic development of the rural areas. What has brought particularly noxious effects was the underestimation of the importance of infrastructure for the standard of living of man as both producer and consumer.

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MIGRATION AND THE HOUSING MARKET. RECENT TRENDS IN THE VIENNA AGGLOMERATION

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1. INTRODUCTION

The population projections for Vienna have changed significantly in two recent years. All the forecasts up to 1987/1988 projected a constant loss in population for the municipality within the following decades. Current revised projections, considering the new demographic trends, indicate a stabilization of the population figures within the next two decades. The first positive effect of the new demographic behaviour on population projections was noticeable in 1988, because the favourable trend in fertility rates for Vienna was considered in the forecasts (Hanika 1988; Findl and Hanika 1988).[1] In 1989, the assumptions on migration were revised to meet the current positive trend. In its last population projection, the statistical office assumes a positive balance of migration for Vienna with 4800 persons, instead of the 3000 in the previous forecasts (Hanika 1989).[2]

Besides leading to more positive projections in the population structure (e.g. positive effects of migration on the number of young persons, and thus also on overall birth-rates) and a stabilization of workforce (Fassmann 1989), a non-decreasing population for the next decade will naturally have some general quantitative effect on the Viennese housing market.

In the following, the current demographic trends, which will have the most pervasive effect on future housing market dynamics, will be considered only: inmigration to and outmigration from Vienna.[3] If one concentrates on migration, i.e. moves which are mainly induced by non-housing related aspects, one should, in fact, take the whole agglomeration of Vienna (the whole labour-market area, including some surrounding districts belonging to the province of Lower Austria) as the reference area. Nevertheless, as Vienna is a political unit in its own right (*Bundesland*) and a lot of statistical figures are published on the regional level of provinces only, migration data for the whole agglomeration are not available in general. Thus, most of the results given in the following refer to the core of the agglomeration (the municipality of Vienna). Only some considerations are given to in- and outmigration (housing related moves) between the city and its surroundings.

Before describing the structure of recent migrational trends (section 3) and its possible effects on housing market dynamics (section 4), some basic characteristics of the Vienna housing market are given in section 2.

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[1] Between 1977 and 1988 the total fertility rate for Vienna increased by 11%, from 1.28 to 1.42 (see Sauberer 1989).

[2] See Sauberer (1989) for a detailed analysis of fertility, mortality and the changing migrational trends within the agglomeration during this century.

[3] As it is impossible to distinguish the nationality in most of the migrational data, the expressions inmigration and outmigration are used in this paper for all moves across the municipal boundary.

2. THE VIENNA HOUSING MARKET: BASIC CHARACTERISTICS

Because of massive building activity at the end of the last and the beginning of the current century (the so-called Founders-Period), Vienna has an extremely aged housing stock. In 1981, roughly 40% of all the dwellings were located in buildings dating back to before the First World War. Most of these buildings are owned privately and the dwellings are rented to households in general. In 1981, only 2233 (0.7%) of the dwellings within the aged housing stock were owner-occupied dwellings (condominiums), 4% of the dwellings was used by the owner of the building. As there was some tendency during the 1980s to convert rental dwellings into owner-occupation and attics into dwellings, the number of condominiums increased slightly in the meantime. Due to (a) legal restrictions on entry to some of the housing submarkets (e.g. council housing and subsidized new housing); (b) long search and waiting periods for specific submarkets (e.g. council housing and newly built housing in general); (c) informal segmentation lines within specific submarkets (e.g. internal takeovers within the sector of co-operative housing; Matznetter 1989); and (d) the spatial orientation of inmigrants, clustering in the central districts, the aged rental housing sector is the most important housing segment for inmigrating population groups.

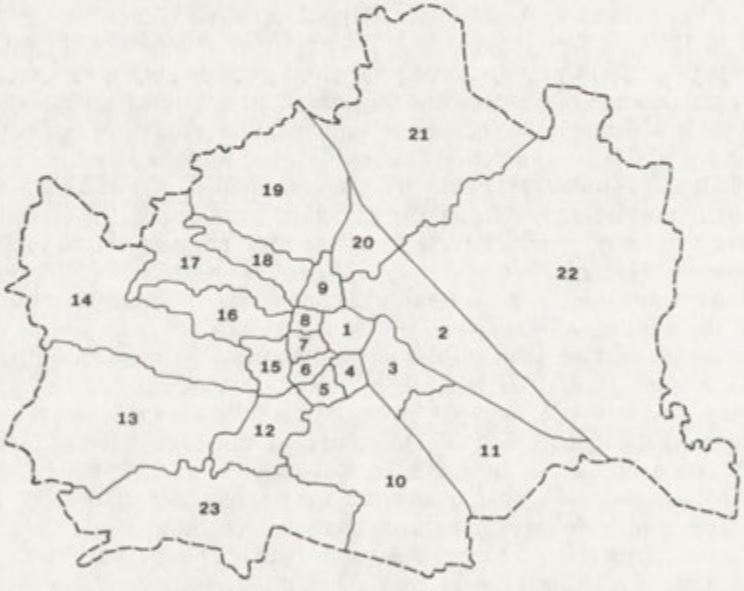

Fig. 1. City of Vienna by districts

Within this sector, one can observe a relatively clear spatial quality pattern. Larger dwellings with higher standards are located in good places next to the centre (districts 1, 4, 7–9 and parts of 3, 6 — Fig. 1). With the increasing distance to the city centre, the quality of dwellings and locational quality decreases. The worst dwellings within the aged housing stock are found close to the *Gürtel* (one of the main traffic arterials, separating the inner and outer districts; i.e. districts 5, 15–17, 10, 12) and the districts between the canal of the Danube and the Danube itself (districts 2, 20). A typical dwelling in these working class buildings dating to the late Founders-Period is less than 35 m^2 and minus indoor WC and bathing facilities.

Since the early 1970s dwelling improvement (either by the tenant or the owner of the house) has been subsidized considerably. This has led to immense improvement activities within the aged housing stock. In spatial terms, the improvement activities started over-

proportionally in the best locations within the central districts in the 1970s and are currently rather high in absolute and relative terms in medium locational qualities in the inner districts and some of the (north)-western districts (e.g. in parts of the districts 15–18 and 3). They are still rather low in absolute terms for the worst locational qualities (districts 5, 20, 10, 12; see Aufhauser, Giffinger and Knotig 1989).

Since 1986, building rehabilitation has also been subsidized. Due to the increasing demand for high-quality housing near the city centre, rehabilitation works rather well without subsidies in the best central locations. Subsidized building rehabilitation during the last years was overproportionally high in medium locational qualities (Bökemann 1990), e.g. some of the central districts (districts 6–9, 3, 2) and parts of the (north)-western districts (districts 18, 19). Activities were extremely low at the worst locations in central districts (districts 20, 5).

Rents within the aged housing sector depended on the time a household had received the rental agreement, on dwelling quality according to basic sanitation facilities (at the time a household moved into the dwelling) and the current status of rehabilitation.[4] Roughly, one can describe rent diversification as follows: rental agreements for dwellings which were designed before 1968 have extremely low basic rents in general. Since 1981, these low rent levels have been allowed to increase up to 2/3 of the current regulated rent levels for new rental agreements to enforce rehabilitational activities. If rehabilitational work is carried out, rents may increase for 10 years to cover the non-subsidized costs exceeding the rental reserve. Dwellings rented between 1968 and 1985 are, in general, connected with higher (regulated) rental levels according to the sanitation facility. Since 1986, free market rents are legal for standard category A dwellings (dwellings with indoor WC, bathing facilities and central heating). Locational quality has to be paid for with illegal key-money even for dwellings with a good standard (Czasny 1988). When looking at current housing offers, it seems that the market for high-quality housing within the aged housing stock (i.e. improved dwellings in rehabilitated buildings at good locational quality in the central districts) has recently shifted these initial payments to higher monthly rents. Nevertheless, high illegal payments of key-money (unrelated to locational quality) are still common for lower standard dwellings.

More than 200 000 dwellings (nearly 30% of all the occupied dwellings in 1981) are owned by the municipality. During the 1980s, roughly 40% of all the newly built dwellings (an average of 2200 dwellings per year) were council housing. Entry into this housing sector is restricted for nearly all inmigrant groups. Only Austrian citizens who have been registered in Vienna for at least a year and who can prove their urgent housing need (e.g. due to overcrowding) may apply for a dwelling. Besides, there are income restrictions and the waiting time is often over two years.

Although cooperative housing built after Second World War amounts to roughly 50 000 units, this housing sector (and, especially, the cheaper part of it) is not easy for inmigrants without personal, informal connections to enter.

Roughly 3000 subsidized units in multifamily dwellings are newly built per year with a decreasing proportion in owner occupation (currently 20%). Subsidized new condominiums are concentrated at better locations either in central (districts 4, 7–9) or the (north)-western districts (districts 16–18). New rental/cooperative housing concentrated on the edges of the high-density areas and in outskirt locations in the 1970s and early 1980s (Matznetter 1989). Currently, one can observe some spatial shift to locations closer to the centre even for the new rental/cooperative housing. Access to new subsidized housing sectors is restricted to Austrian citizens.[5] Besides, the high initial payments do restrict access for low income inmigrating households (Köppl and Pohl 1988).

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[4] See Aufhauser, Fischer and Schönhofer (1990) for a detailed description of cost differentiation within the Vienna housing sector.

[5] Non-Austrian households may gain access to new housing built by housing cooperations, but are not entitled to the public subsidy scheme.

Free financed condominiums are, in principle, accessible to all demand groups. Nevertheless, the extremely high costs within this sector do exclude households with a low and medium income. Roughly 700–1000 newly built dwellings are offered on the market each year, spatially located mainly in the noble districts of the Hietzing (district 13) and Döbling (district 19).

3. RECENT MIGRATIONAL TRENDS IN THE VIENNA AGGLOMERATION

Before describing recent trends of migration, some information on the data used in the analysis has to be given.[6] Since 1978, the municipal council of Vienna has tried to observe the basic migration trends within, to and from the city. Between 1978 and 1980, figures were calculated on changes within the voters' register, and thus do not include children and foreigners. Since 1981, the registration list of inhabitants, based on the census of 1981, has been used for calculating the figures. In the first three years (1981–1983), foreigners with the permanent place of residence in other countries (mainly foreign workers from Jugoslavia and Turkey) were excluded. Besides, the quality of data even for internal migration is not good for this period. In 1984, the data base was changed again; all foreigners (and Austrians), registered, disregarding their possible additional places of residence, were included. The last revision of data base took place in 1988 with a revision and clearance of the register list. This revision had two main effects. First, outmigration figures jumped because of the delayed consideration of persons who have obviously not obeyed the rules for notice of withdrawal. Secondly, the figure for inmigration from foreign countries unknown was 12 000 in 1988 (see Table 1) due to the delayed consideration of moves by foreigners to Vienna. Most of the additional 12 000 foreign inmigrants to Vienna in 1988 are, in fact, foreign workers who had moved to Vienna before that year. Unfortunately, exact measures of the effect of this data revision processes are not available (for some basic lines see Satzinger 1988). Beside this revision effect, the figures for 1988 should be handled with additional care as they include some migration which, in fact, took place in the year 1987 (roughly 3000 for inmigration and 2000 for outmigration).

Although the exact figures have to be regarded with reserve, nevertheless the main trends in hmigration seem to have been grasped. As the quality of data improved with time, the analysis will concentrate on data available for 1984–1988 (including information on foreigners), as well as on more detailed (age-specific) data for the period 1987–1988.

The main trends of migration within the surroundings of Vienna can be described indirectly by using data related to the city (and province) of Vienna only. Practically, no current data on the household composition of migrants are available (the only study in that area was performed in the late 1960s; Kaufmann 1976).

A detailed analysis of the different multidimensional aspects of migration described in the following was accomplished with the so-called log-linear models (see Wrigley 1985 and Aufhauser and Fischer 1985 for methodological details). In this paper, only the most significant results of the analysis are described.

3.1. INMIGRATION TO VIENNA

Within the last 5 years, inmigration to Vienna has risen considerably, from about 30 000 persons in 1984/1985 to about 50 000 in 1988 (see Table 2). To see what might happen in the housing sector, one has to examine the structure of current migration trends in more detail.

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[6] Most of the data referred to have been provided by the statistical office of the Municipal Council of Vienna. My special thanks go to Helmut Ritter, M.A. and Andreas Weigl, M.A. who made available much unpublished data and provided valuable background information.

TABLE 1. Inmigrants to Vienna by regions of origin, 1984–1988

Region of origin	1984	1985	1986	1987	1988	1984–88	1984	1985	1986	1987	1988	1984–88
	absolute						in % total					
Surroundings	5222	5280	5956	6223	6056	28737	17.0	17.6	14.4	14.4	10.1	14.0
Rest Lower Austria	4603	4662	5559	5752	5132	25708	15.0	15.5	13.5	13.3	8.6	12.5
Upper Austria	1161	1118	1491	1779	1708	7257	3.8	3.7	3.6	4.1	2.9	3.5
Salzburg	557	550	724	828	810	3469	1.8	1.8	1.8	1.9	1.4	1.7
Tirol	364	410	467	511	544	2296	1.2	1.4	1.1	1.2	.9	1.1
Vorarlberg	243	188	283	319	322	1355	.8	.6	.7	.7	.5	.7
Burgenland	1108	1202	1566	1686	1582	7144	3.6	4.0	3.8	3.9	2.6	3.5
Styria	1574	1604	1866	1964	2038	9046	5.1	5.3	4.5	4.5	3.4	4.4
Carinthia	667	767	1054	1156	1148	4792	2.2	2.6	2.6	2.7	1.9	2.3
Austria unknown	3493	3536	3162	2693	5990	18874	11.4	11.8	7.7	6.2	10.0	9.2
FRG	1112	896	1400	1366	1281	6055	3.6	3.0	3.4	3.2	2.1	3.0
Rest of Europe	6643	5845	12677	13974	16694	55833	21.6	19.5	30.7	32.2	27.9	27.2
Overseas	3338	2724	4560	4446	4427	19495	10.8	9.1	11.1	10.3	7.4	9.5
Foreign unknown	686	1250	465	650	12001	15052	2.2	4.2	1.1	1.5	20.1	7.3
Total	30771	30032	41230	43347	59733	205113						

Source: Unpublished data, Municipal Council of Vienna; own combination.

TABLE 2. Basic migration figures for Vienna, 1984–1988

	1984	1985	1986	1987	1988
Total inmigration	30771	29990	41230	43347	59733
from Austria	18992	19275	22128	22911	25330
from abroad	11779	10715	19102	20436	34403
Austrian citizens	18247	19029	21520	22625	25136
Non-Austrians	12523	11095	19710	20722	34597
Total outmigration	31816	30056	36928	33423	46060
to Austria	17966	20099	21778	19538	26262
from abroad	13850	9957	15150	13885	19798
Austrian citizens	20310	20247	22505	20656	27480
Non-Austrians	11411	9112	14423	12767	18580
net migration	−1045	−66	4302	9924	13673
from Austria	−1026	−825	350	3373	−932
from abroad	−2071	758	3952	6551	14605
Austrian citizens	−2063	−1218	−985	1969	−2344
Non-Austrians	1112	1983	5287	7955	16057

Source: Unpublished data, Municipal Council of Vienna; own combination.

3.1.1. Main components of inmigration

Due to the legal regulations on entry to different housing segments in Vienna (section 2), a major distinction has to be made between the inmigration of Austrian citizens and of Non-Austrians. Although the inmigration of Austrians has increased considerably within the last five years, the large increase in total figures was caused by the enormous increase in foreign inmigration. Considering the change in data base in 1988, one can roughly note that the figures for foreign inmigration had doubled between 1984 and 1988.[7] About 1300–1500 Austrians per year are returning from abroad to Austria, the rest coming from other Austrian provinces. The main part of foreign inmigrants is directly moving from abroad to Vienna, roughly 2000 foreigners per year migrated from other Austrian provinces to Vienna in the period 1984/1986.[8]

3.1.2. Age-sex differentiation of inmigration

The age-sex differentiation of inmigration is rather typical, and has the following characteristics:

(a) The most mobile age is between 20 and 30 years; roughly 2/3 of all the inmigrants are aged 20 to 40 when inmigrating; males slightly dominate (54% for inmigration from Austria, 58% for inmigration from foreign countries).

(b) Female mobility is higher between 15 and 20 years and decreases constantly from 25 onwards; females again predominate in the age groups above 60.

(c) Mobility of children is highest in infants and neglectable at school-age.

[7] In addition, one has to mention a significant increase in the illegal inmigration of foreigners over recent years which is not covered by the data. Sauberer (1990) estimates 10 000 to 12 000 illegal inmigrants to Austria in 1988.

[8] There are no data on territoriality and citizenship available for the period 1987/1988.

(d) The age-sex profile of foreign inmigration indicates a slight variation of this pattern: inmigration of males is more dominant, that of children increases with age, the age group of 20 to 30 is less dominant and the decrease from age 25 onward is less rapid.

(e) Austrians returning from abroad to Vienna are usually older than those inmigrating from other Austrian provinces; they also tend more often to be accompanied by children.

This age-sex structure of inmigrants has been rather stable for the last years. One can notice a slight relative decline in the dominance of the age-groups 20–25 and 30–40 in internal migration during the last years most probably due to the improvement of the labour market situation outside Vienna during the period 1987/1988.

3.1.3. Where do the inmigrants come from?

Table 2 indicates the distribution of inmigrants to Vienna by region of origin for 1984 to 1988. The surrounding parts of Lower Austria have always been one of the major sources of Viennese inmigration. Currently, 5000 to 6000 persons per year migrate from the surroundings to Vienna, accounting for roughly 1/4 of all Austrian inmigration. This proportion is rather stable over time. According to the population census of 1981, 28% of all Austrian inmigration to Vienna during the period 1976–1981 originated in the surroundings (see Sauberer 1989). Although inmigration figures from these regions increased during recent years also in absolute terms, the increase was relatively small.

Inmigration from all other regions of Austria increased slightly within the observed period. One third of all Austrian inmigrants come from the part of the surrounding province of Lower Austria which does not belong to the agglomeration, and from the province of Burgenland; roughly 8% derive from the province of Styria. The increase in inmigrants from the southern parts of Austria, the province of Carinthia, was remarkably high, the figure nearly doubled – from 670 in 1984 to 1150 in 1988.

The number of inmigrants from the FRG fluctuates between 900 and 1400 persons per year and does not show any temporal structure. Generally, Vienna's gain in German inmigration during the period 1984–1988 was about 200 persons per year. Overseas inmigration has increased by 1/3 in recent 5 years. Vienna has gained about 1000 persons per year in this migration within the period under discussion.

Inmigration from European countries other than the FRG has increased the most during the last years; the position of foreign unknowns of about 12 000 in 1988 has to be distributed over the whole period and attributed mainly to this regional position. The exact figures for the increase cannot be given because of the data revision in 1988. One might suppose that the size of foreign inmigration has increased by about 3000 to 4000 within the last years.

3.1.4. Where do the inmigrants move to?

Table 3 shows the distribution of inmigrants to the individual districts of Vienna. Main points in the spatial location behaviour of inmigrants are the following:

(a) Considering the mobility behaviour within the city, inmigrants move to the inner districts more often (districts 1–9, 20): 41% in comparison to 29% in total inner-city mobility. The movement of inmigrants to the old housing stock in the southern inner districts (districts 10, 12) and the western parts (especially district 15) is overproportionally high. Only 15% of all inmigrants went to the southern and eastern (suburban) districts, as compared with 30% in the total inner-city mobility.

(b) Inmigrants from Austria reveal a migrational behaviour which is more similar to inner-city mobility patterns in general. They more often move to the southern and north--eastern outer districts (21% of all inmigrating persons from Austria as compared with 9% of the inmigrants from foreign countries). Besides, they show a preference for the better western districts of the city (for example, district 18) and move less often to the worse districts within the high-denisty area of the city (districts 5, 15).

TABLE 3. Inmigration to and outmigration from Vienna, 1984–1988, by districts

District	Population 1981	% of Vienna	Inmigration absolute	as % of 1981	Outmigration absolute	as % of 1981	In + Outmigration absolute	as % of 1981	Net migration
1	19 537	1.3	3 467	18	5 155	26	8 622	44	−1 688
2	95 892	6.3	15 413	16	8 639	9	24 052	25	6 774
3	86 054	5.6	12 665	15	6 494	8	19 159	22	6 171
4	31 800	2.1	4 053	13	9 499	30	13 552	43	−5 446
5	52 436	3.4	13 360	25	9 434	18	22 794	43	3 926
6	28 771	1.9	6 181	21	3 935	14	10 116	35	2 246
7	28 490	1.9	5 787	20	8 938	31	14 725	52	−3 151
8	24 769	1.6	4 041	16	4 417	18	8 458	34	−376
9	45 314	3.0	6 235	14	4 818	11	11 053	24	1 417
20	73 696	4.8	12 556	17	5 812	8	18 368	25	6 744
Centre	486 759	31.8	83 758	17	67 141	14	150 899	31	16 617
10	147 101	9.6	20 141	14	6 698	5	26 839	18	13 443
11	65 859	4.3	4 464	7	5 043	8	9 507	14	−579
12	79 408	5.2	10 390	13	13 482	17	23 872	30	−3 092
13	55 331	3.6	4 977	9	4 546	8	9 523	17	431
23	72 998	4.8	6 465	9	9 296	13	15 761	22	−2 831
South	420 697	27.5	46 437	11	39 065	9	85 502	20	7 372
14	78 996	5.2	9 969	13	8 998	11	18 967	24	971
15	70 066	4.6	17 122	24	7 704	11	24 826	35	9 418
16	88 587	5.8	11 379	13	10 193	12	21 572	24	1 186
17	49 337	3.2	8 266	17	13 545	27	21 811	44	−5 279
18	52 548	3.4	5 088	10	9 315	18	14 403	27	−4 227
19	67 522	4.4	7 555	11	6 866	10	14 421	21	689
North-West	407 056	26.6	56 379	15	56 621	14	116 000	28	2 758
21	116 033	7.6	10 015	9	7 149	6	17 164	15	2 866
22	99 801	6.5	5 524	6	9 437	9	14 961	15	−3 913
North-East	215 834	14.1	15 539	7	16 586	8	32 125	15	−1 047
Vienna	1 530 346	100	205 113	13	179 413	12	384 526	25	25 700

Source: Unpublished data by the Municipal Office of Vienna; own combination.

(c) Those inmigrating from the surroundings show a spatial migrational behaviour rather similar to trends in inner-city mobility: an overproportional tendency for the southern and eastern suburban districts in general. They more rarely move to the inner (districts 5–9) and the north-western parts (districts 15–19).

(d) Persons inmigrating from the neighbouring provinces of Lower Austria and Burgenland are similar in their spatial behaviour to those inmigrating from the surroundings of Vienna, although the tendency to move to the southern districts is less distinct and they also move more often to the north-western districts (districts 16, 18).

(e) Inmigrants from other Austrian provinces are more heterogeneous in their spatial behaviour. They prefer the better inner districts (districts 4, 6–9), avoid the southern (inner) districts (districts 10, 12), move more often to the north-western parts (districts 16, 18) and

overproportionally frequently move to the outer suburban districts in the north-east (district 22). across the Danube.

(f) German inmigrants prefer to live in the better inner districts (districts 1, 4–9) and in the noble districts of Hietzing (district 13) and Döbling (district 19). They rarely cross the Danube or move to the worse north-western districts (districts 15–17).

(g) That leaves the worst districts for other foreign inmigrants (mainly foreign labour and refugees): the high-density areas of Vienna with a concentration of poorly equipped dwellings and poor locational quality (districts 2, 5, 10, 12, 15, 17, 20).

There does not seem to be any strong gender differentiation in the spatial behaviour of inmigrants in general. Nevertheless, one can state the differences due to age.

(a) Inmigration of family households is more concentrated in the southern and north-eastern suburban districts (districts 11, 22).

(b) Young inmigrants aged 15 to 20 move more often to the worse parts within the high-density areas of Vienna (districts 2, 5, 10, 15–17, 20) and rarely move to the noble districts (districts 13, 19) or the suburban eastern areas (district 22).

(c) Those aged 20 to 30 are concentrated in the better inner-city districts (districts 1, 3, 6–9) and some of the north-western parts (districts 15, 16).

(d) Inmigrants at the age of 30–40 indicate a tendency to move to some of the better north-western central areas (districts 6–9).

(e) Inmigrants to the noble districts of Hietzing (district 13) and Döbling (district 19) are, in general, above the age of 30.

(f) Austrian inmigration at the age of 15–20 is overproportionally high in the 10th district, at the age of 20–25 considerably positive for the north-western parts (districts 16, 17). Austrians inmigrating at the age of 25–30 move more often to the north-western districts next to the centre (districts 8, 9) and more rarely to the eastern suburbs (for example district 22).

(g) Those inmigrating from Austria at the age between 40 and 50 move more often to the noble district of Döbling (district 19) and distinct inner-city districts (districts 3, 6), and more rarely to the working class southern districts next to the centre (districts 10–12).

Looking at the temporal trends in spatial location behaviour, one can find only a few significant changes in this pattern. Specifically, foreign labour inmigration has been concentrated more on the 5th, 10th and 12th district for the last years and the north-western district of Währing (district 18) is gaining in inmigration of Austrians coming from areas other than the surroundings of Vienna.

3.2. OUTMIGRATION FROM VIENNA

There has been an enormous increase in inmigration to Vienna within recent years, but there has also been an increase in outmigration from Vienna. Nevertheless, while inmigration nearly doubled, outmigration rose by roughly 50%, from about 32 000 in 1984 to 40 000 to 46 000 in 1988 (see Table 2).[9] Since 1986 the official figures indicate a positive net migration for Vienna, a trend which is in contrast to what was observed in the 1970s and the early 1980s when Vienna lost enormously in migration (roughly 8000 to 10 000 persons per year with regard to Austrians in the 1970s). To understand the possible effects of current outmigration trends on the Viennese housing market, one has to look at the structure behind the overall outmigration figures, as well as the net migration.

[9] As mentioned earlier in this section, the exact outmigration figures should be treated with reserve.

3.2.1. Main components of outmigration

A detailed account of the outmigration figures reveals some interesting aspects. Vienna was still losing Austrian migrants within the last years, although this loss has been decreasing constantly and seems to be discontinued now. In the period 1987/1988, migration was roughly balanced. Looking at outmigration figures for Austrians, one can see that roughly 20 000 to 24 000 persons left Vienna each year during the 1980s. It seems plausible that there will not be changes in these outmigration figures within the following years. That is to say that the outmigration of Austrians will probably continue at a level of roughly 22 000 persons per year, including about 20 000 persons moving to other provinces of Austria, 1500–2000 persons moving abroad. If the currently observed slight increase in inmigration figures continues (the average for the period 1987/1988 was nearly 24 000), Vienna will be gaining roughly 1000 to 2000 persons with Austrian citizenship per year. Nevertheless, with the strengthening of the labour market outside Vienna within the last two years, it is doubtful if this inmigration increase will continue.

Considering the data revision, the outmigration figures for foreigners also seem to be more or less constant, with roughly 10 000 to 15 000 persons leaving Vienna each year. In contrast to the migration of Austrians, this constant figure of outmigration has been paralleled by an enormous increase in inmigration figures for this group within the last years. The net foreign migration to and from Vienna has increased by roughly 4000 persons per year since 1985. If this trend continues,[10] the considerable effects of forced foreign inmigration on the Vienna housing market will have to be expected.

3.2.2. Age-sex differentiation in outmigration

Parallel to sex differentiation in inmigration, female outmigration is considerably smaller than the male, especially in the case of migration abroad (54% of the migrants moving to other Austrian provinces are males, as compared with 58% of the migrants moving abroad).

The dominant age of outmigrants is between 20 and 50 years and generally higher than the age of inmigrants. Thirtyfive per cent of all outmigration to other Austrian provinces takes place at the age 30 to 50 (in contrast to 28% for inmigration). The comparable figures for international migrations are 47% for outmigration versus 33% for inmigration.

Outmigration of children and young people aged 5 to 20 is higher for international migration; persons above 40 are proportionately more numerous among outmigrants to other Austrian provinces.

Outmigration of small children decreased within the period 1984–1988, outmigration of persons between 30 and 50 increased. Data suggest a relative increase in outmigration to other Austrian provinces for those aged 20–25. This should be a result of the increasing education related mobility in the early 1980s and related return migration in the late 1980s.

Outmigration to other Austrian provinces is overproportional for infants and for persons aged 40–50; in comparison with foreign outmigration it is less dominated by children, young adults and persons at age of 30 and 40.

[10] At the end of 1989, huge restructuring processes started in the formerly planned economies in the East-Central Europe. Recent studies (Sauberer 1990 and *Arbeitsgemeinschaft Wien 2010*, 1990) draw scenarios with a positive net migration up to 10 000 persons per year for the eastern regions of Austria. However, the actual size of inmigration during the next years will heavily depend on the Austrian inmigration policy, which is not fixed at the moment.

3.2.3. Where do different groups of outmigrants move from in Vienna?

In principle, the total size of inmigration to and outmigration from individual districts of Vienna mirror their population size (see section 3.3. for a detailed description of deviations from this general principle). Since the most important results on the Vienna housing market caused by migration should be derived from balancing in- and outmigrational groups, only a few trends will be given below.

Outmigration to the surroundings of Vienna often originates in the southern parts of the city (districts 11, 12, 23) and the north-eastern suburbs (districts 21, 22). It is rarely related to the former residence in the high density areas of the inner city (districts 2–9, 20) or the north-west (districts 15–19).

Migrants moving to the other parts of Austria are similar to those moving to the surroundings with respect to the former place of residence within the city. Nevertheless, the spatial pattern of origin is not so pronounced owing to the greater heterogeneity of this group. For instance, those moving further away more rarely migrate from the southern districts and more often from inner-city districts and the western parts of the town.

Persons migrating to the FRG often live in the good inner-city districts (districts 1, 4, 7–9) and the noble districts of Hietzing and Döbling (districts 13, 19).

The distribution of the origins of persons migrating to other countries in Europe is dominated by the typical places of residence for foreign labour migrants (districts 2, 5, 10, 15, 17, 20).

Families with children typically move from the southern and north-eastern outskirts, young adults at the age 20 to 30 (students) migrate more often from the inner parts of the city (districts 5, 6, 7, 20) and the (north)-western areas (districts 14, 15, 17).

3.2.4. Where do the different groups of outmigrants go to?

Within the last five years, about 7000 to 8000 persons per year have moved to the surroundings of Vienna (more than 20% of all outmigration). Thus, Vienna is still losing inhabitants to the outskirts (about 1500 persons per year). As the figure is more or less constant over this period, it can be supposed that the trend of suburbanization is stabilized.

Net migration to the other provinces of Austria is not clear owing to the high figure in the unknown position. Nevertheless, Vienna seems to gain in migration with the western provinces and rather considerably with southern Austria.

Outmigration to the FRG is constant for that period with 900 to 1000 persons moving per year. Net migration is slightly positive for Vienna.

The increase in outmigration overseas parallels the increase in inmigration, leading in total to a positive net migration of about 1000 persons per year.

The temporal development of outmigration to other countries of Europe (which is dominated by foreign labour), is unclear because of the data revision in 1988.

3.3. BALANCING IN- AND OUTMIGRATION IN INDIVIDUAL DISTRICTS OF VIENNA

Table 3 shows the size of inmigration to and outmigration from different districts of Vienna, as well as the net migration for the whole period 1984–1988.

Taking the sum of in- and outmigration as a total measure of interregional population fluctuation within a district, one can see the following. Some of the districts close to the city centre (districts 1, 4–8, 12, 20), as well as the north-western districts (districts 15–18) are the areas mostly affected by migration (in relation to the total population, 1981). These are the districts where the old private rental housing stock of Vienna is concentrated. The

differentiation of in- and outmigration rates relative to population size results in the following picture.

(a) Relatively high in- and outmigration, with inmigration exceeding outmigration (positive net migration) are characteristic of the western districts situated next to the city centre (districts 5, 6).

(b) Relatively high in- and outmigration with outmigration exceeding inmigration (negative net migration) is characteristic of some of the western central districts (districts 7, 8) and one of the districts in the north-west (district 17).

(c) Relatively high inmigration paralleled by relatively low outmigration (positive net migration) is characteristic of the districts which are the main residential areas of foreign labour (districts 2, 3, 15, 20).

(d) Low inmigration paralleled by relatively high outmigration (negative net migration) is characteristic of the office district southwest of the city centre (district 4), the high density working class district in the south (district 12), the north-western district of Währing (district 18) and the southern-most district in the outskirts (district 23).

(e) Relatively low in- and outmigration with inmigration exceeding outmigration (positive net migration) is characteristic of the typical working class district of Favoriten (district 10, which is currently one of the main inmigration areas for foreign labour) and the suburban district of Floridsdorf (district 21).

(f) Relatively low in- and outmigration with outmigration exceeding inmigration (negative net migration) is typical for the suburban district of Donaustadt (district 22) in the north-east.

(g) More or less balanced in- and outmigration (with total migration paralleling roughly population size and slightly positive net migration) is typical for the good inner-city district of Alsergrund (district 9) and the districts in the (north-)west which currently undergo rather extensive rehabilitation (districts 14, 16).

(h) More or less balanced in- and outmigration with relatively low migration rates in general is typical for the noble districts of Hietzing (district 13) and Döbling (district 19; with a slightly positive net migration) and the south-eastern suburban district of Simmering (district 11).

4. MIGRATION AND THE HOUSING MARKET

What is important for the future housing market dynamics is not migration as such, but migration balances for different social groups and the moving behaviour of these. As based on the current migrational trends, as outlined in Chapter 3, and the specific characteristics of the Vienna housing market, as outlined in Chapter 2, possible scenarios of the future dynamics on the Vienna housing market are sketched below. Because of the lack of adequate information or exact data, this description of possible trends is more qualitative than quantitative.

4.1. INTERNAL MIGRATION AND THE HOUSING MARKET

Between 1984 and 1988, Vienna gained roughly 16 000 young persons of the age of 15 to 25 from the other Austrian provinces. The bulk of inmigration at this age is caused by the higher educational facilities of Vienna (e.g. the university) and the position of Vienna as a labour market. There was a distinct increase in the number of young inmigrants of between 15 and 25 years in the mid-1980s. The poor labour market situation for young people during this period reinforced the general trend for higher education. In recent years, this trend of the increasing inmigration of young people to Vienna has slowed down. Beside a demographic effect (those who are now starting higher education and holding their first jobs

were born in the early 1970s when fertility rates declined rapidly), one can observe a positive development on the labour market for young people outside Vienna over recent years.

One may expect no further effects of inmigration of young people on the Vienna housing market in general as long as the adequate turnover of dwellings between inmigrating and outmigrating groups is ensured. Nevertheless, there is a relative shortage of cheap rental dwellings within the old rental housing sector (the sector where young inmigrants, both single and couples, typically move to when coming to Vienna) due to rehabilitation activities.

The young inmigrants under 30 staying in Vienna for some time (e.g. after completing their education) will have some influence on the Vienna housing market – most probably *via* successive mobility behaviour – and especially, if the increase is continued. Nevertheless, current changes in the structure of housing supply might parallel the additional housing demand occurring with the increase in this group: well equipped dwellings in good locations close to the centre with relatively high (current) rents and cooperative/rental dwellings and condominiums constructed after the Second World War. Some of the inmigrating Austrians of higher age will be oriented in these sectors as well.

The net migration to other Austrian provinces is negative for the age groups over 30 (the highest loss for persons aged 40 to 50) and dependent children under 15. As there are no disaggregated data available for age-group and regional migration (and due to the high proportion of migration which cannot be located regionally), an exact assessment of the effects of migration trends for those over 30 is impossible. Only a few general tendencies can be observed.

More than 30% of all outmigration destinations are located in the surrounding province of Lower Austria. The strong suburbanization trend of the 1970s slowed down but did not stop in the 1980s. According to the census of 1981, Vienna lost 15 700 persons to the province of Lower Austria through migration in 1976–1981. The comparable figure for the 1984–1988 period indicates some 6100 to 10 000 (depending on the proportion of 'unknown' migration assigned to the migration between Lower Austria and Vienna).

It is mainly families (with children) that still move to the surroundings of Vienna. In comparison with what was observed in the 1960s or 1970s the age at the time of moving to the surroundings had slightly decreased. Most probably there will be a stable continuing demand by Viennese households for single family and other low density housing in the surroundings for the following years (see Sauberer 1990 for some additional discussion).

The effects of the outmigration on the Viennese housing market can be seen as follows. Those living either in old rental housing, cooperative housing and owner occupation units built between the 1950s and early 1970s, as well as in the older local council housing before moving (with their children), often pass on those dwellings directly to their grown up children or keep the dwellings (vacant) for future use by children. With the decrease in the outmigrational age, the latter option (keeping the dwelling for children) will become even more important. The relatively high proportion of owner occupation housing built after 1945, which has been offered on short rental agreements since the early 1980s (Czasny 1988, 29), might be a hint. Obviously, keeping dwellings (vacant) decreases the official housing supply (i.e., 13% of the Viennese housing stock was not permanently occupied in 1981), but it does decrease the housing problem for the young people migrating (back) to Vienna who can actually move to those dwellings. It is generally cheaper to pay the additional costs for a vacant dwelling for a few years than to start with a new housing agreement at the time one really needs the dwelling.

With the increasing proportion of households moving to the surroundings at the age of 30 to 40, there might be an additional effect on the housing market. Those living in the more expensive rental and owner-occupied housing stock built in the 1970s and early 1980s mainly on the outskirts (the new housing at the time the household was formed), or with new rental agreements in the old rental sector before moving to the surroundings, are generally unable to afford to keep two housing units simultaneously. Currently, one can observe the increasing number of rental and owner-occupied housing built in the 1970s (mainly in the suburbs) which

are offered on the market. Looking at the spatial differentiation of inmigrating households, this sector seems to be important for internal inmigrants (e.g. at non-student ages and/or with a family).

In summarizing the effects of internal migration and its impact on the housing market, one can see that the current behaviour of different in- and outmigrating groups does not cause dramatic shifts on the housing market. The necessary turnover between in- and outmigrating groups is possible in some of the housing segments (either directly or *via* housing chains) and additional demand seems to parallel the current shift in housing supply. Nevertheless, due to rehabilitation activities within the aged housing stock, a limited shortage of cheap rental housing for student groups is to be expected.

4.2. FOREIGN MIGRATION AND THE HOUSING MARKET

The current trends of foreign migration are expected to have a much stronger effect on the future housing market dynamics. A huge social pressure in the following years will emerge if the continuing foreign inmigration is not matched by adequate changes in housing policy. The most problematic trend, with respect to the housing market, is the massive upsurge in the number of inmigrating foreign guest workers to Vienna. Legal restrictions prevent this group from applying for the local council housing and subsidized (new) housing. The housing demand has to concentrate on the old rental housing stock. Income, as well as social restrictions, typically force this group into poor quality housing in the worst locations (i.e. substandard dwellings lacking basic sanitation facilities in the high-density areas). High (illegal) key-money and/or (illegal) high rents without any rental agreement are typical for the entry into this housing segment.

Due to massive dwelling improvement and housing rehabilitation activities reinforced by subsidies, the supply within the traditional housing segment for foreign inmigrants will decrease considerably. The possible consequences for future housing market dynamics and the urban social structure in general can be sketched as follows. Subsidized housing rehabilitation and dwelling improvement (since 1985) have resulted in rather good results in locations with medium locational quality, i.e. in good locations in the inner districts (6–9) but also in better locations outside the *Gürtel* (parts of the districts 16–19). This leads to the increasing spatial concentration of dwellings of poor quality in the worst locations.

The considerable increase in the housing costs is connected with the improvement activities (see Aufhauser, Giffinger and Knötig 1989). Even if inmigrating foreign households can afford the increasing costs of the improved dwellings, they are expected to be pushed out of that housing segment by financially and socially stronger groups of Austrians. The increasing supply of well equipped dwellings in rehabilitated buildings in good locations will be paralleled by the increase in internal demand, resulting from the decrease in the number of newly built dwellings[11] and the growth in the size of the group of urban-oriented households.

In comparison with other large cities, Vienna has until recently shown a relatively low spatial concentration of foreign inmigrants.[12] With foreign inmigrants being ousted from better locations within the high-density areas of the city, their segregation or concentration will become more distinct. The analysis of migration data for 1984–1988 indicates that

[11] Facing the changing inmigration dynamics, the communal housing policy started in 1990 with efforts to stimulate the new housing construction.

[12] More specifically, one could observe relatively low segregation on the spatial level of districts and subdistricts, but there is a considerable segregation on the building (block) level (Leitner 1981; Lichtenberger 1984).

this process has already begun. In comparison with the mid-1980s, the movement of inmigrants from other than the FRG countries of Europe is now significantly smaller to the districts which did better on improvement and rehabilitation activities (districts 16–19) and significantly greater to the districts with extremely small scale improvement and rehabilitation activities (districts 5, 10 and 20).

In addition to this spatial concentration, continuous foreign inmigration might affect housing costs. If the permanent decrease in the supply of (cheap) substandard dwellings is paralleled by a steady increase in demand within this sector (there are, in fact, no other options available on the housing market for this group), this will lead to a massive demand pressure and, probably, to the increasing (illegal) housing costs within the worst housing segment of Vienna.[13]

Another effect of foreign inmigration on the Vienna housing sector should also be mentioned. The increase in foreign inmigration to Vienna caused by its expanding international functions has led to the increasing demand for high-quality (rental) housing, and the increase in housing costs within the high-quality segment of the Vienna housing sector. Private housing and dwelling rehabilitation without subsidies in the best locations of the inner city seem to be one way of satisfying the increasing demand of this group.

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[13]Increasing demand pressure, a shortage of newly constructed dwellings, the relaxation of strict rental regulations for good standard dwellings in 1986, together with huge rehabilitation activities has already resulted in a dramatic increase in housing cost in general.

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SPATIAL DEMOGRAPHIC TRENDS AND PATTERNS IN THE WARSAW URBAN REGION

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1. INTRODUCTION

The basic framework of demographic processes is the age-sex population structure, shaped by births, deaths and migration flows. From another prospective, a given age structure determines to a certain degree, the intensity of natural population change, as well as migration flows. Hence, the main problem of demography includes the analysis of the interdependences between the age-sex structure and the basic components of population change. This problem, with reference made to the present and future population growth in the Warsaw region, is taken up in this paper.

2. THE EVOLUTION AND SPATIAL STRUCTURE OF POPULATION GROWTH

The spatial structure of the Warsaw region can be defined with the use of a coarse-grain division, into the following zones: 1) the core, corresponding to the central district of Warsaw, 2) the inner ring, encompassing the remaining six city districts, and 3) the outer ring, in which urban and rural areas are distinguished. Moreover, the outer ring is disaggregated by sectors (Fig. 1).

Population movements between the respective zones and changes in the spatial structure of the region in the period of 1950–1985 are presented below.

First, it is relevant to follow the process of the spatial population change in the Warsaw region. The rates of population growth by zones in the 1950–1985 period against the regional average taken as 100% are shown in Fig. 2A. It should be emphasized that the high degree of population concentration in the city of Warsaw reaches 68.2%. The shares of the city and the remaining zones in the total population of the region have fluctuated since 1960. The rate of population growth in the core and inner ring was lower in the 1960–1970 period than in the post-war period of reconstruction (1950–1960), owing to the growth limitation policy. The drop in the growth rate of Warsaw below the regional average was compensated by the increase in the population number in the region's outer ring. The differentiation of the population growth rate of Warsaw's districts is shown in Fig. 2B. In the period under discussion, one discerns an increase in the growth rate in the districts of Żoliborz and Praga South only where new housing estates were developed. In the 1970s, one notes a reversal of the

Fig. 1. The urban region of Warsaw
a – city of Warsaw and other urban areas, b – sector, c – zone, I – core, II – inner ring (a – west, b – east sides); sectors of the outer ring: 1 – Kampinos, 2 – Błonie, 3 – Pruszków, 4 – Piaseczno, 5 – Otwock, 6 – Mińsk Mazowiecki, 7 – Wołomin, 8 – Legionowo

earlier trends – an accelerated increase in Warsaw's population and a fall in the growth rate of the outer ring caused by a change in the state investment policy, housing construction including.

The annual population growth rates in the Warsaw region between 1970 and 1985 by zones and sectors can be seen in Fig. 3. This development is correlated with the increase in birth rates in the 1970s related to the post-war baby-boom generation entering the reproductive age. The peak phase of the second cycle of growth falls in the 1973–1978 period, when the growth rate for the city of Warsaw was about 2% annually, while in individual districts of the inner zone it exceeded this value significantly (Fig. 4). The highest growth rates were noted in the districts of Mokotów (about 4–5% annually) and Praga North (where the index oscillated between 4% in 1973 and 7.3% in 1977). That period saw the gigantic construction sites of housing estates: Stegny and Ursynów-Natolin in Mokotów and the Bródno estate in Praga North.

Population growth rates in the urban places of the outer zone were similarly high and reached 2.5% in 1973 and 1.6% in 1978. The rapid drop in the rate of growth of towns within

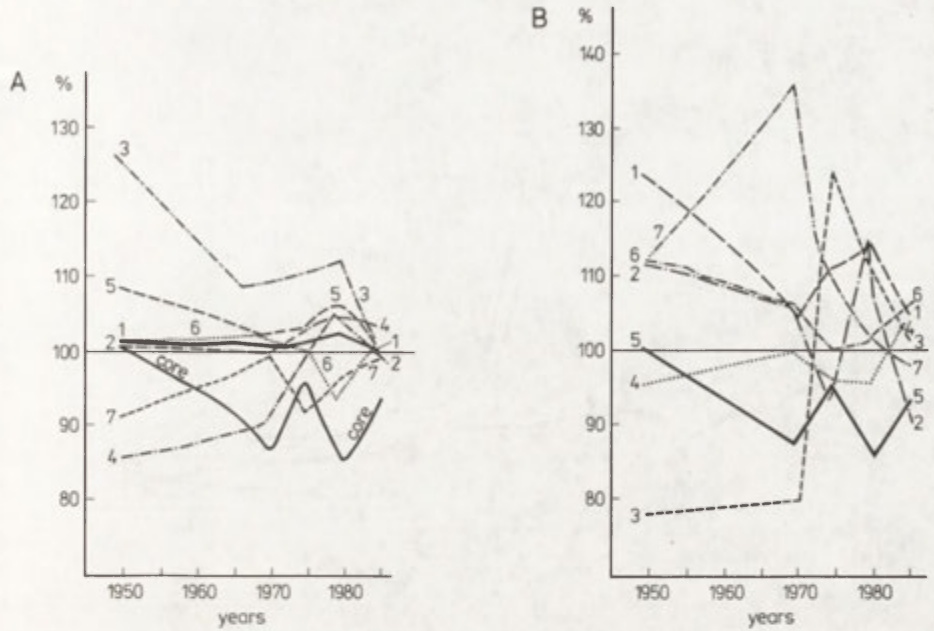

Fig. 2. Population growth in the Warsaw Urban Region, 1950–1985. Regional rate = 100%
A – by zones: 1 – cities of region, 2 – city of Warsaw, 3 – west side, 4 – east side of inner ring, 5 – inner ring, 6 – cities of outer ring, 7 – rural areas of outer ring
B – by districts of the city of Warsaw: 1 – Mokotów, 2 – Ochota, 3 – Praga South, 4 – Praga North, 5 – Śródmieście, 6 – Wola, 7 – Żoliborz

this zone in 1976–1977 (–6.2%) results from the fact that the town of Ursus was incorporated into Warsaw's administrative boundaries in 1977. At the same time, a corresponding rapid population increase occurred in the district of Ochota (25.5%). Only the district of Śródmieście was systematically losing its population from 1970 till 1984 (about 1% annually at the beginning of the 1970s and as much as 3.3% in 1978). In 1985, nonetheless, a positive population growth rate was recorded in this district (0.44%).

The remaining rural areas of the region, i.e. rural communes of the Warsaw voivodship, were losing their population in the period discussed, with negative indices appearing untill the end of 1977. From 1978 on the regional population growth rates fell from 1.5% to 0.5–0.6% annually, and for the towns of the outer ring to 0.8%, while the respective growth rates in rural areas in the outer ring rose from about zero (0.27 in 1978) to 1% in 1985. This trend is associated with the breakdown of housing construction programmes and a sharp economic crisis, involving a tremendous rise in the costs of housing construction. A fall in population growth rates (to about zero) in all Warsaw districts is evident and, starting from 1978, a population decrease in districts of Śródmieście and Ochota.

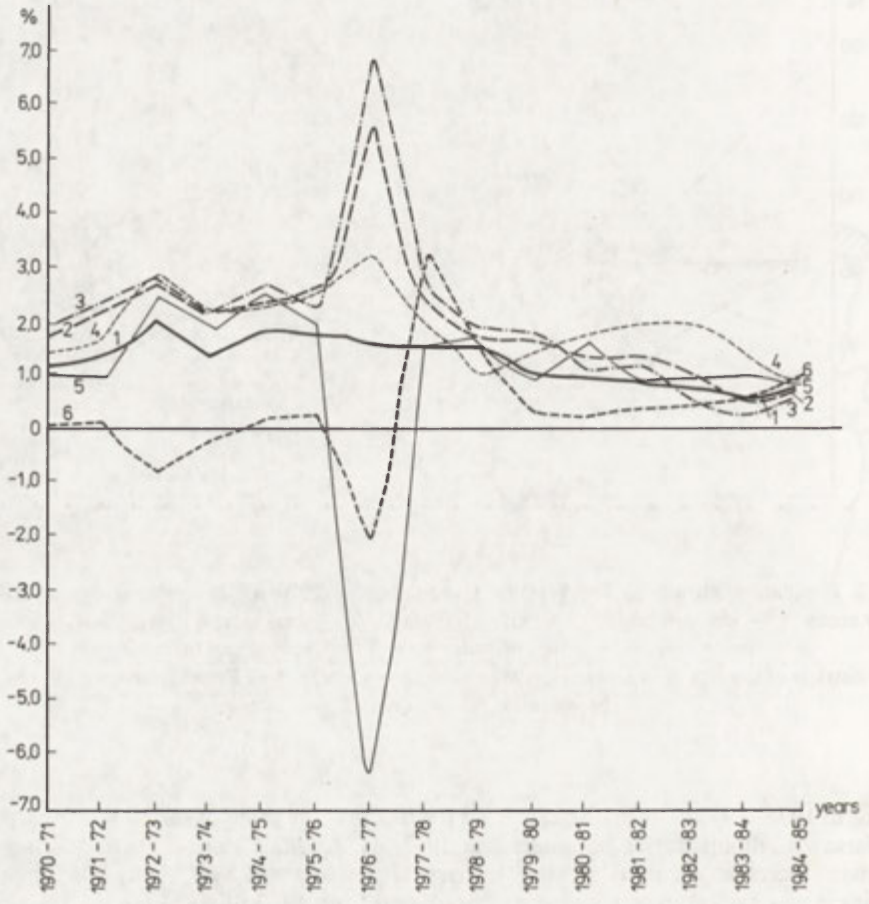

Fig. 3. Annual rates of population growth, 1970–1985
1 — region of Warsaw, 2 — inner ring, 3 — west side of inner ring, 4 — east side of inner ring, 5 — cities of outer ring, 6 — rural areas of outer ring

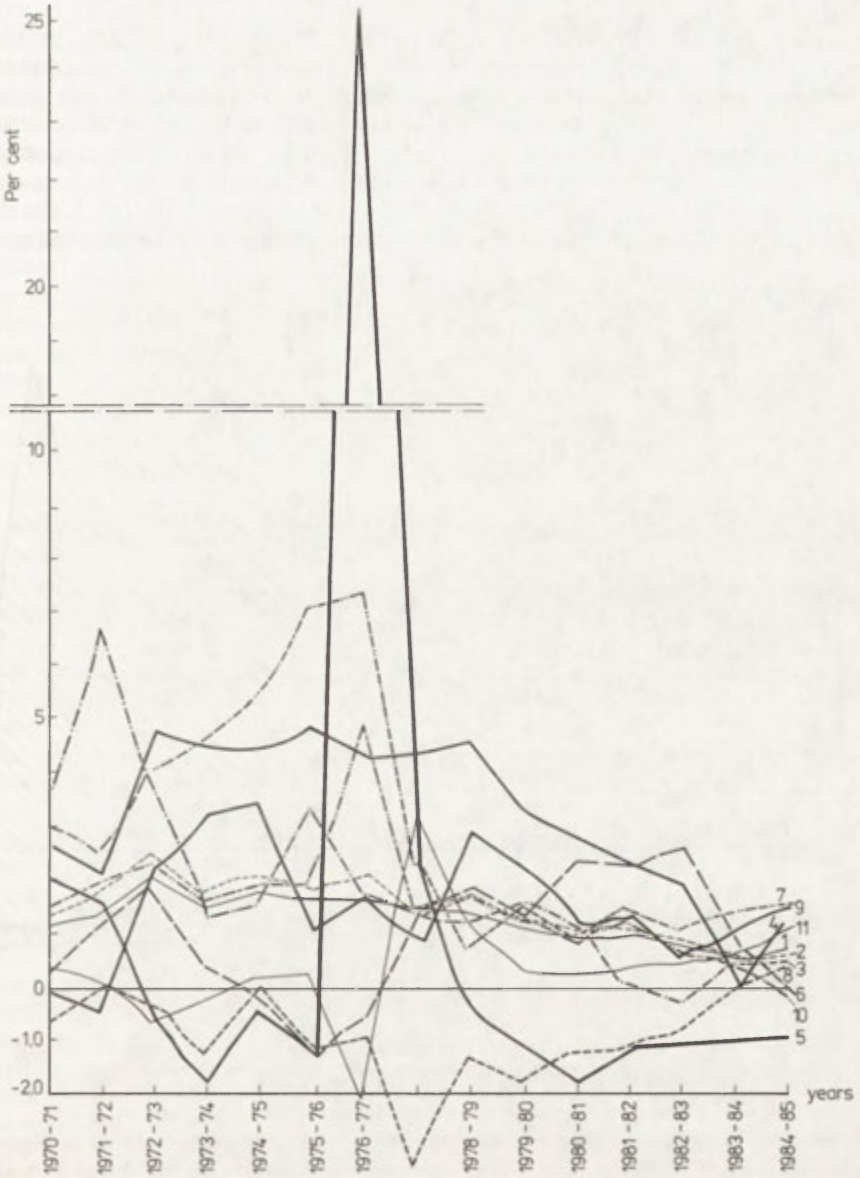

Fig. 4. Annual rates of population growth, 1970–1985
1 – population change of Warsaw region, 2 – urban population change of region, 3 – population change of the city of Warsaw, 4–10 – population change in districts of Warsaw: 4 – Mokotów, 5 – Ochota, 6 – Praga S, 7 – Praga N, 8 – Śródmieście, 9 – Wola, 10 – Żoliborz, 11 – rural areas of outer ring

3. NATURAL INCREASE AND NET MIGRATION AT THE INTRA-REGIONAL SCALE

Low birth rates are characteristic of Warsaw (2.6‰ in 1985, −0.5‰ in 1987) in comparison with the national average (6‰ in 1987). It should, however, be stressed that while the natural increase was always, except for the Warsaw core, positive after the war, in the case of the outer ring, the birth rate there was always higher than in the city of Warsaw (slightly higher in urban places, several times higher in rural areas). Warsaw's population growth depends to a large extent on inmigration which traditionally constitutes the main component of the total population change (72% in 1978, 73% in 1981, but 49.6% in 1985). The drop in inmigration occurred from 1978 on, and a simultaneous decline in the natural increase after 1980.

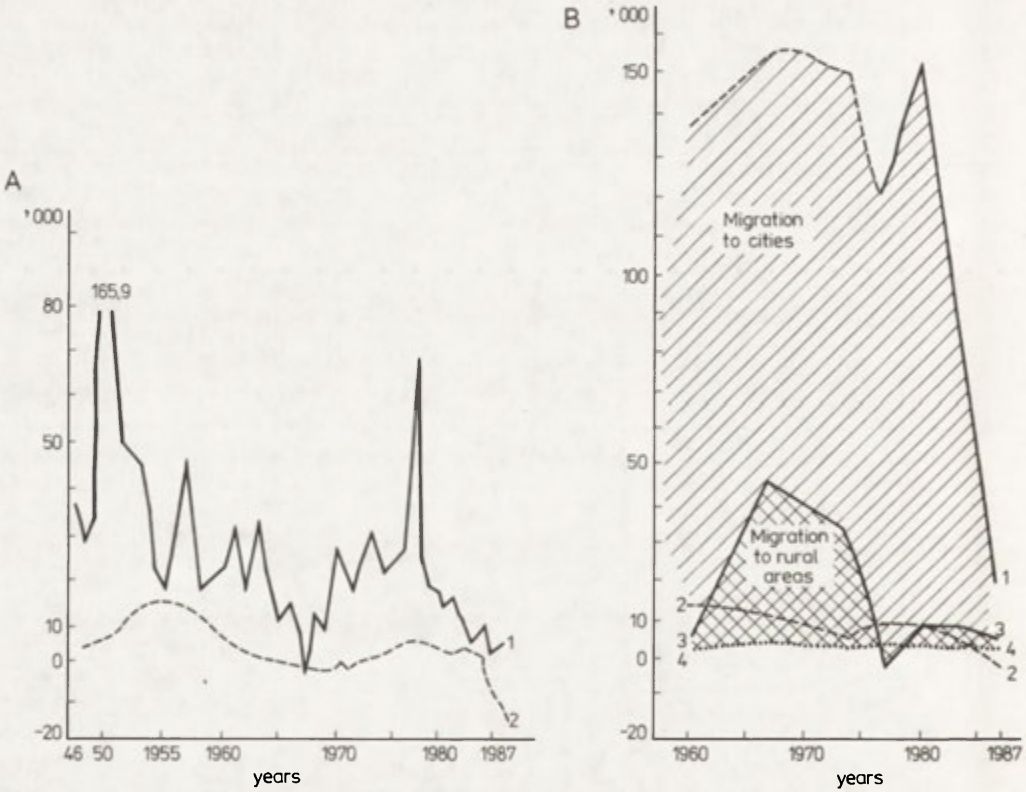

Fig. 5. Total population change in the Warsaw Region
A — Warsaw, B — cities and rural areas of the outer ring: 1 — total population change in Warsaw and other cities, 2 — natural increase in Warsaw and other cities, 3 — total population change in rural areas, 4 — natural increase in rural areas

Individual components of the population growth in the Warsaw region are analyzed, herein on the example of the capital city of Warsaw (Fig. 5A), and also in particular zones of the region (Fig. 5B). Figure 5A presents in absolute terms the shares of both components which, when taken together, determine the magnitudes of the annual rates of the total population changes. Attention should be paid to particular development phases of the capital's population after the war. In the first ten-year period, Warsaw experienced the highest dynamics of natural increase, composed of the increasing tendency of birth rates and the decreasing tendency of death rates. This was the compensatory phase after the destructive

results of the war. The highest value of natural increase (about 16.0‰) was observed in Warsaw in 1955. The annual total rates of the population change in Warsaw show large variations. The population growth was controlled and limited by the changing official policies. The maximum increase was noted in 1951 in connection with the three-fold increase in the municipal area. As a result of the change in the administrative boundaries, there was an increase in the population number by 156 200, which, together with the natural increase, summed up to 165 900. The subsequent peak in population increase occurred in 1957 and was partly caused by the inclusion of the township of Rembertów and Kawęczyn, accounting together for 24 700 inhabitants. In 1977, the subsequent inclusion of the town of Ursus into Warsaw contributed to the total increase in the capital's population by more than 68 000. Significant variations in the annual rates of the total population changes were caused not only by the extension of Warsaw's municipal boundaries, but also by periodical shifts in the strictness of the domicile registration regulations. The entry limitations were introduced in Warsaw in the period of the highest natural increase. The data in Fig. 5A corroborate the hypothesis that the population increase in Warsaw after the Second World War, was mainly shaped by the size of migrational inflow. The size of migration, and especially of inmigration, depended upon official policies aimed primarily at the limiting of migration to Warsaw, mainly in the framework of the "deglomeration" policies, carried on during the 1960s. For instance, the introduction of registration constraints for persons coming to Warsaw to live and work, influenced the total inmigration drastically. In 1967, after the new regulations had been introduced, a drop of inmigration was observed from some 50 000 persons per year down to a mere 20 000.

Around 1956, a sharp drop in the natural increase values, caused mainly by the decrease of births and the increase in mortality, was noted. At the end of the 1960s, the role of natural increase in the total demographic growth of Warsaw diminished. Differences appeared between the core and the inner ring; since 1966, there has been a negative natural increase in the core, which persists up to now.

The result of the gradual liberalization of the policies of limiting the inmigration to Warsaw after 1970 is represented in Fig. 5A by the increase in the size of migration. Official decisions coincided with the downward trend of the natural increase. A general tendency in the drop of the natural increase rate appeared in all three zones of the region and reflected the analogous tendency prevailing in Poland as a whole. In fact, only the natural increase rates in rural areas of the outer ring were close to the national average, while other rates were much lower. It should be added that indices of natural increase in the outer ring remained at a relatively high level, approaching 8% until the end of the 1970s. This phenomenon should be explained by the relatively young age of the population of the outer ring and the high proportion of the inmigrating population, which resulted in high levels of both fertility and mobility in this zone, as compared with the population of the city of Warsaw.

With regard to general demographic trends, the baby boom of the early 1950s was reflected by the birth rate increase (i.e. the demographic echo) in the 1970s. The subsequent decrease in the total population growth was connected with the diminishing inmigration to Warsaw, which appeared in 1975 and lasted until 1985. After the residence permits had been abolished in 1984, an increase in the size of migrations to Warsaw and the Warsaw region was observed in the 1986–1987 period. Simultaneously, there has been a further drop in the natural increase in recent years, caused both by the decrease in birth rates, and by the abrupt increase in mortality rates in all the zones of the region (but especially in the core area, where a negative natural increase in 1987 amounted to 5.5‰). In the region as a whole, the pattern of change was similar to that of the central city (Fig. 5B). The slow but constant fall in the natural increase rate caused the latter to differ even more sharply from the national average which has been stabilized since the mid-1970s (Korcelli and Węclawowicz 1985; 162). When analyzing the net migration rate for Warsaw and the rest of the region, one should take note of significant disparities. Up to 1981 Warsaw was characterized by high inmigration and net migration rates with low outmigration rates. A limited positive net migration occurred in the

outer ring (with the exception of 1975 and 1977 when changes in the administrative boundaries involved oscillations in those rates) and migration losses occurred between 1980 and 1981 (the rate of net migration was −0.07 in 1981).

The city of Warsaw is a gainer in the migration exchange with the surrounding area, i.e. the rest of the Warsaw voivodship. Nevertheless, the rates of inmigration (per 1000 inhabitants) to the outer ring are three times higher than those of inmigration to Warsaw, while the outmigration rates are about five times higher. This phenomenon was partly explained by the administrativie control of inmigration. After the abolishment of the residence permits in Warsaw, the outmigration rate did not change (4.1% in 1981 and 4% in 1985) while inmigration fell two and half times (12.5% in 1981, to 5% in 1985). The outer ring had a positive net migration.

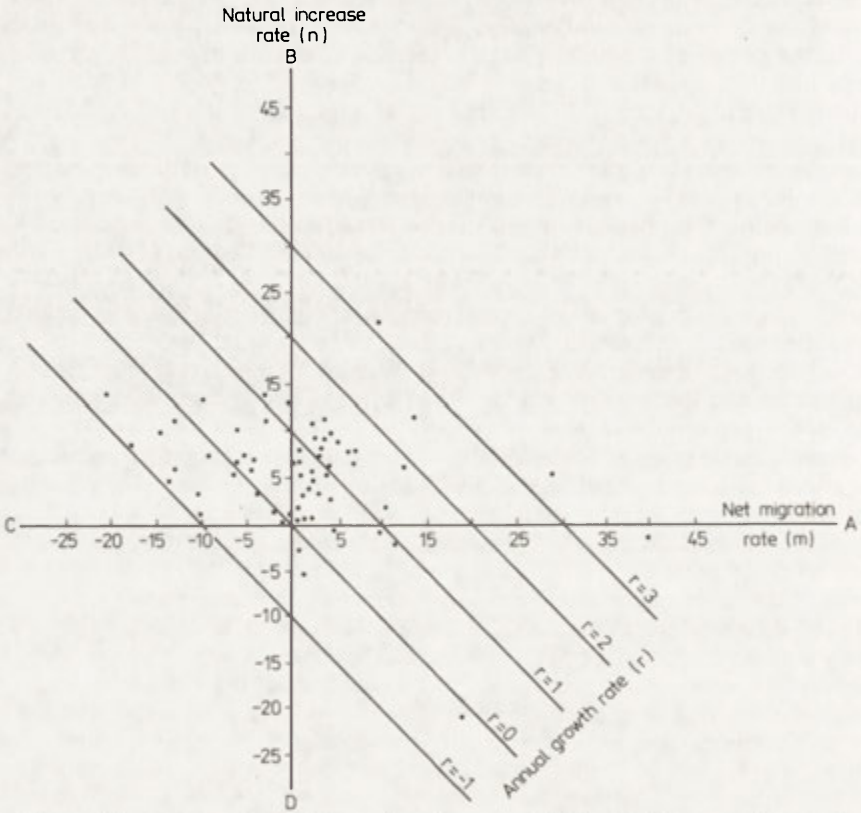

Fig. 6a. Natural increase rate (n) and net migration rate (m) in the Warsaw urban region, 1985

The interaction of migration and the natural increase in the region was analysed (based on the 1985 data) using the Webb (1963) method which allows the identification of the main types of population growth based on indices of net migration and natural increase. Generally, this method groups territorial units in eight types of population development, depending upon the signs and absolute values of the rates of the two components of change. The 65 key administrative units of the region are identified in the scatter diagram in Figure 6a. They are to be found to the right and left, respectively, of the downward-sloping lines that separate different rates of population growth. The four quadrants classify the 65 observations according to the positive or negative nature of natural change and net inmigration. The relative contribution of net migration and natural increase to regional population growth is also

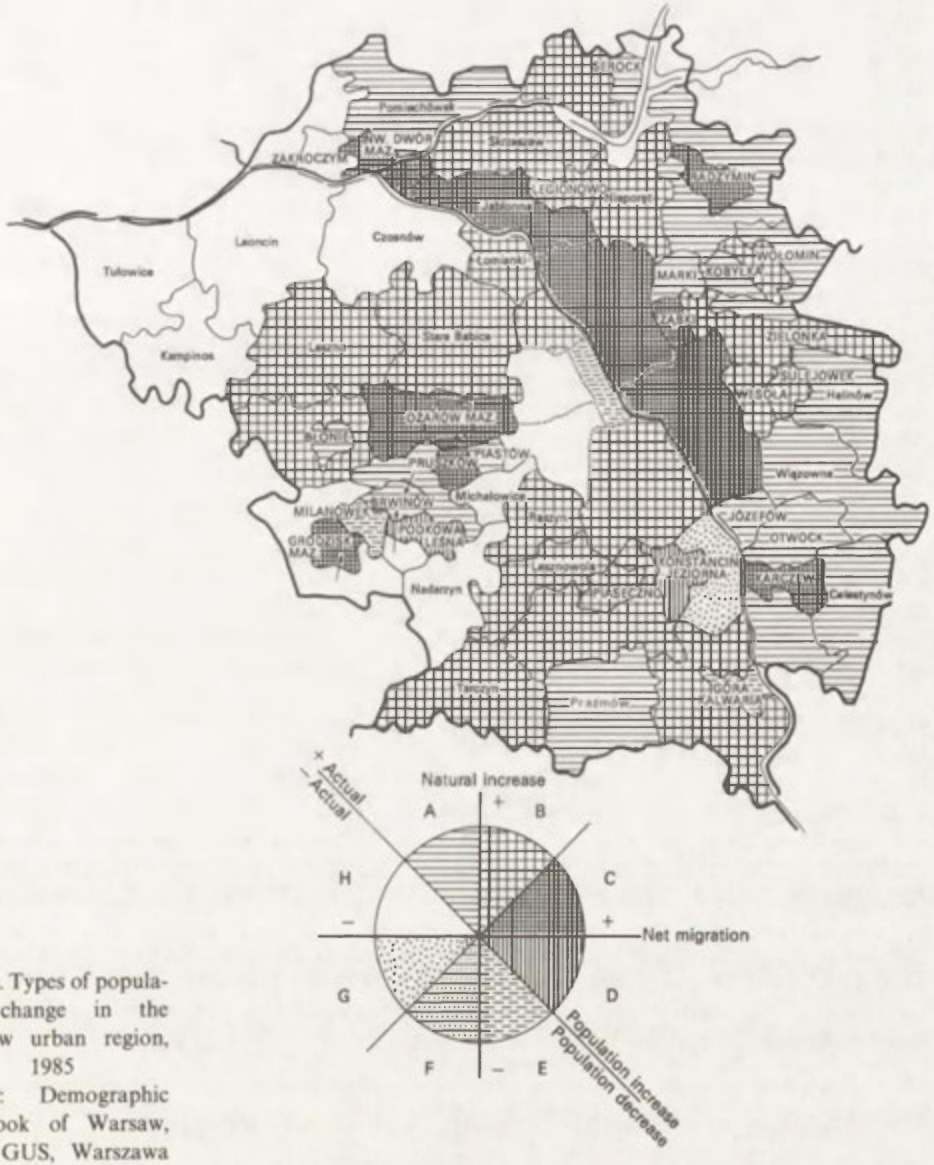

Fig. 6b. Types of population change in the Warsaw urban region, 1985

Source: Demographic Yearbook of Warsaw, 1986, GUS, Warszawa

identified in Figure 6a. A 45% counter-clockwise rotation of the horizontal and vertical axes divides the 65 observations into four quadrants, marked A, B, C, and D in this figure. All populations in quadrant A were growing primarily as a consequence of net inmigration, and those in B owing to natural increase. Regional populations in quadrant C were declining mainly because of net outmigration and those in D were due to natural decrease.

The spatial distribution of individual administrative units of the region, which represent various types of population change, is shown in Fig. 6b. In general, areas of absolute population growth dominated in the Warsaw region in 1985. The outer and inner rings were characterized by a predominance of natural increase over positive net migration (type B). Within Warsaw, it was only the Downtown (Śródmieście) district which was typical of great

cities, with its population decrease (type E) owing to negative natural increase (−5.2%). The districts of the eastern side of the inner ring of Warsaw, Praga North and Praga South, had the C type population growth due to positive natural increase and positive net migration (Praga North had the highest absolute net migration gain in Warsaw, i.e. 1075 people). Likewise, in the districts of the western side of the city: northern (Żoliborz) and southern (Mokotów), population was increasing owing to positive indices of both natural increase and migration (type C). Mokotów is characterized by the highest rate of natural increase and migration in Warsaw, reaching 3.4%. The two remaining districts on the western side, Wola and Ochota, were losing population owing to outmigration (type H) (both districts had a negative net migration, the respective rates were −0.44 for Wola and −0.75 for Ochota), and a low natural increase (1% for Wola and 0.3% for Ochota).

The eastern sectors of the outer ring were characterized by population growth owing to the positive values of both components (type B and C). The northern sector, Legionowo, is the most diversified and interesting due to the occurrence of step-by-step migration, e.g. the city and commune of Zakroczym is losing population because of outmigration to the towns of Nowy Dwór Mazowiecki and Legionowo, the rural commune of Jabłonna and the nearby districts of Warsaw (Praga North). The towns receiving migrants are characterized by the predominance of the net migration gain over natural increase.

The sectors of the western side of the region are characterized by various types of population change. The southern sector of this part of the region, Piaseczno, displays a domination of natural change over migrations. The town of Góra Kalwaria and the rural commune of Konstancin–Jeziorna are losing population as a result of a negative natural increase (Góra Kalwaria) and a negative net migration (Konstancin–Jeziorna). Places in the neighbouring sector, Pruszków, are losing population due to migration or a negative natural increase (the town of Milanówek). The remaining towns and rural communes have growing populations owing to a natural increase (type A; the town of Piastów, the rural commune of Brwinów and Nadarzyn), or migration (the town of Podkowa Leśna – type D) or both components (the town of Pruszków – type C). The neighbouring western sector (Błonie) has a growing population owing to both natural increase and inmigration. Only the town of Błonie is losing its population as a result of net outmigration. The same is true of four rural communes in the neighbouring, forested area of Kampinos from where people migrate to neighbouring towns and rural communes and to the town of Nowy Dwór Mazowiecki and the city of Warsaw.

On the regional scale, only in the core and the western districts (Wola and Ochota as well as part of the north-western sector of Kampinos) were population losses registered. The rest of the region was characterized by a population increase, of which migration represented the main component.

4. POPULATION AGE STRUCTURE IN THE WARSAW URBAN REGION

Intra-regional disparities in rates of population growth reflecting variations in natural increase and migration, give rise to regional differentiation in the relative size of particular age groups within the total population.

The age structure of the Warsaw differs importantly from that of the total Polish population and of the Polish urban population. Warsaw has the largest share of people in the 20–59 age brackets (59%) while the corresponding share for Poland is 54.6%, and in rural areas it is 53%. The highest shares of the respective age group were observed in 1985 in the western part of the inner ring (districts of Ochota and Żoliborz – 60.7%, Mokotów – 60.4%, Wola – 59.8%). There are also high shares of people in the labour force age in the eastern districts of the inner ring, and in towns within the eastern part of the outer ring, as well as in sectors of Błonie and Pruszków in the western part (see Fig. 7b). The advanced stage of the demographic ageing, as measured by the share of population aged 60 or over is another

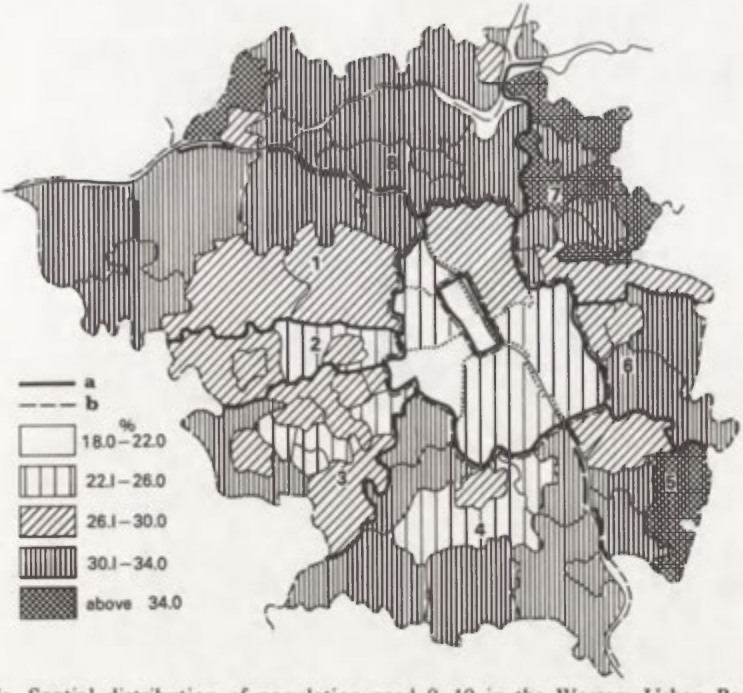

Fig. 7a. Spatial distribution of population aged 0–19 in the Warsaw Urban Region, 1985
a – sector boundary, b – zone boundary, 1–8 cf. Fig. 1

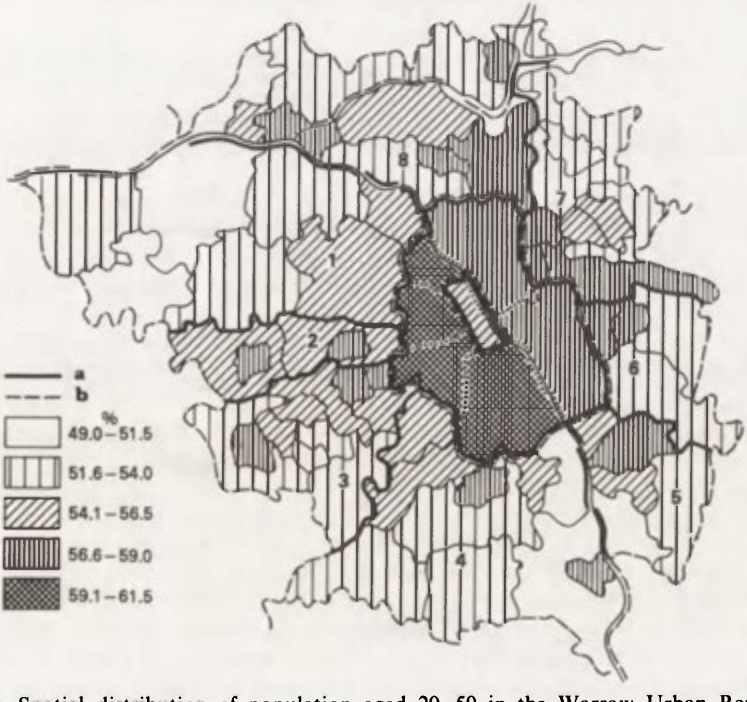

Fig. 7b. Spatial distribution of population aged 20–59 in the Warsaw Urban Region, 1985
a, b – cf. Fig. 7a; 1–8 cf. Fig. 1

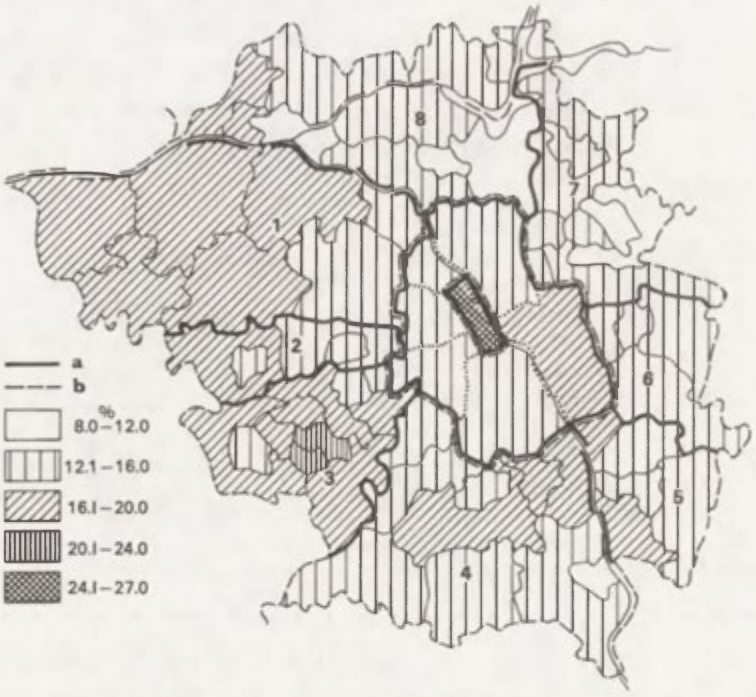

Fig. 7c. Spatial distribution of population aged 60 and over in the Warsaw Urban Region, 1985
a, b — cf. Fig. 7a; 1–8 cf. Fig. 1

specific feature of the age structure in Warsaw. In Poland, this group constitued altogether 12% in 1985, in Warsaw — 16.6%, with the highest percentage in the centre (26.4%), followed by the districts of Ochota (18.3%) and Praga South (17%). There was, therefore, an important differentiation in the age structure between the industrial districts. The lowest stage of demographic ageing was observed in Praga North (13.6%) and Mokotów (14.4%). Demographic ageing was also less advanced in the outer ring of the region where the highest shares of population aged 60 or over appeared in the towns and communes of the Pruszków sector (towns of Podkowa Leśna — 23%, and Milanówek — 19.8%), in the town of Konstancin–Jeziorna (18.8%) and most communes of the Kampinos sector (Fig. 7c).

Simultaneously, Warsaw displayed a relatively low share of children and youth, i.e. people in the 0–19 age brackets (24.1%, while the Polish average was 32%, and 30% for all urban areas). The share of this age group is normally taken as a measure of the biological youth of the population. Within the Warsaw region the lowest share of children and youth is encountered in the centre (18.3%), while the highest — in Praga North (28%) and Mokotów (25.2%). The corresponding shares in the outer ring were higher than in the city of Warsaw, and the highest values were found in 1985 in the communes of the eastern sectors (Zakroczym — 35%, Celestynów and Wołomin — 34% each; — see Fig. 7a). There appear to be concentric belts in terms of the age structure within Warsaw, where essential differences exist between the core and the inner ring districts, as well as within the outer ring where the main differences are between the eastern and western sectors. Similar phenomena are observed when analyzing the spatial distribution of households, and the education and social structure. Figure 8–11 present three-dimensional distributions of population by specific age and sex groups in particular zones (districts) of Warsaw and its region. Figure 8, presenting the female population age structure, indicates its important differentiation by districts. Curves, which represent the structures for the core and the district of Ochota have a flattened shape, related

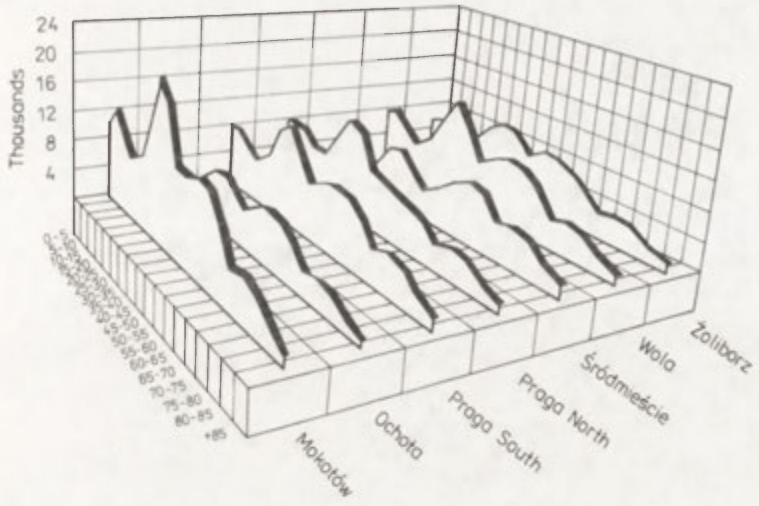

Fig. 8. Population structure, Warsaw 1985 — females

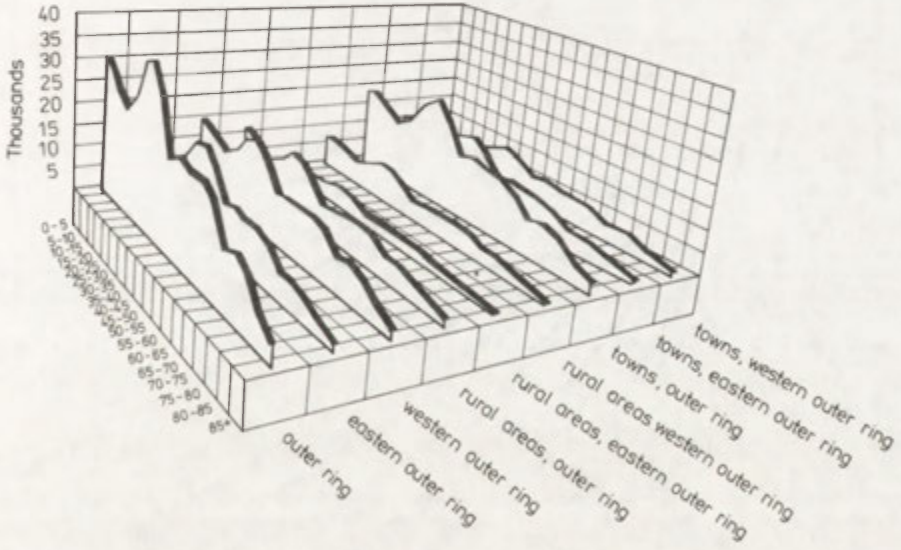

Fig. 9. Population structure, Warsaw region 1985 — females

to low shares of younger and higher shares of older women. Curves representing demographic structure of the female population by five-year age groups have a steep shape for the districts of Mokotów, Praga North and Wola reflecting higher shares of younger women. Similarly, the steep shape of curves for the female population in the outer ring corresponds to the high share of women within the 20–40 age brackets (Fig. 9). The age structures for men by individual districts of Warsaw differ from those for women; their shape corresponds to lower shares of older generations (due to higher mortality of men). The steep shape of curves describing the age structure of men in the districts of Mokotów, Praga and Wola contrast with these pertaining to the city core and Ochota (Fig. 10). Within the outer ring, it is the age distribution for the towns of its western, more industrialized, part that have shapes

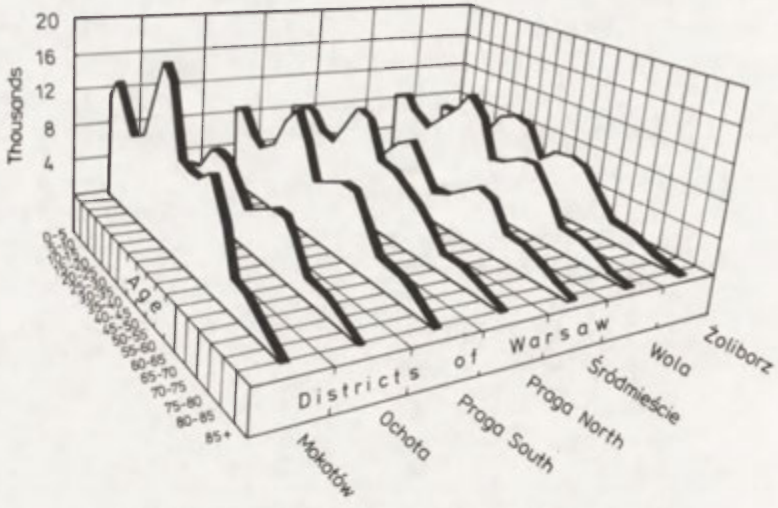

Fig. 10. Population structure, Warsaw 1985 – males

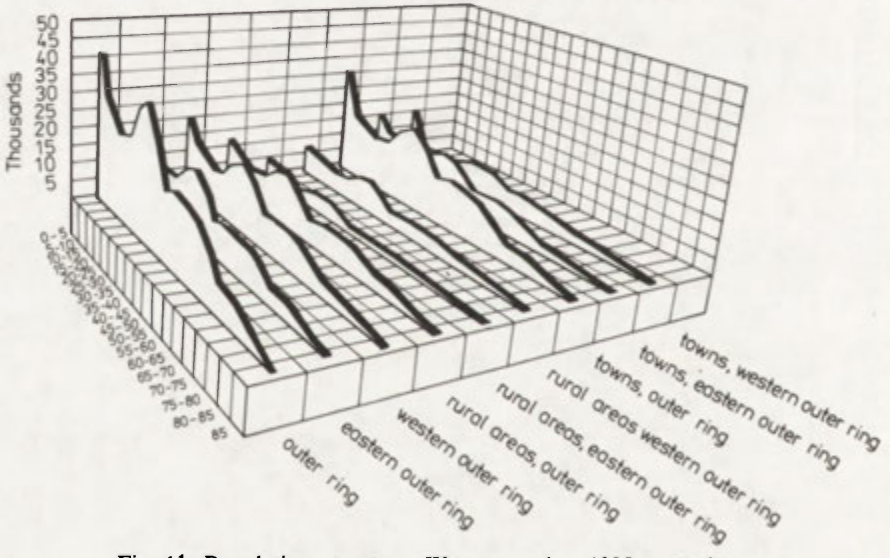

Fig. 11. Population structure, Warsaw region 1985 – males

corresponding to the relatively high share of young population (Fig. 11). Rural areas, as was the case for women, feature flattened shapes of curves, corresponding to higher shares of the older population.

The age structure of population has important consequences for its future growth. The age composition of the recently growing population has a built-in "momentum" for further population growth.

The age structure is a determinant of population growth rates. Figure 12 presents the interdependences between population growth rates and proportions of 0–19 and 65 plus age groups.

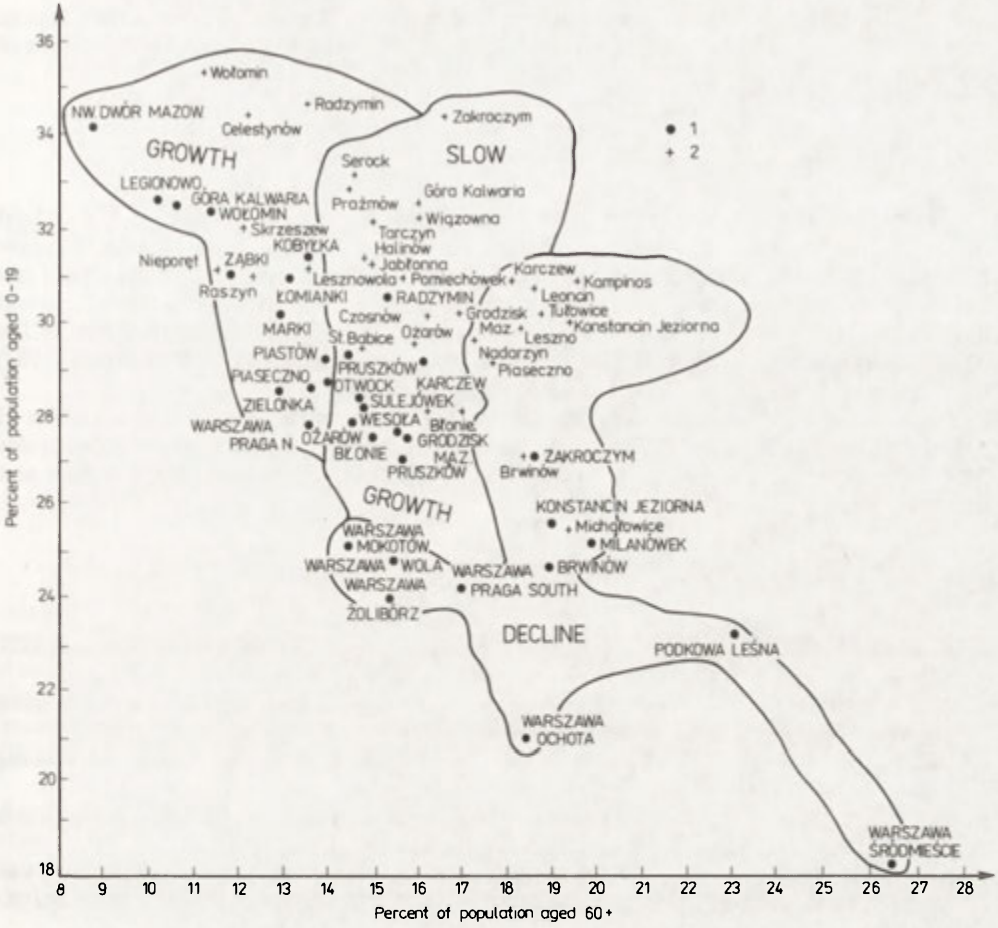

Fig. 12. Regional population change vs population 0–19 and 60 plus age groups, The Warsaw Urban Region, 1985
1 – towns, 2 – communes

Generally, an urban region can represent one of four alternative patterns of the shares of the total population in the 0–19 and 60 plus age group (Korcelli 1985; 139).

One pattern typical for the growing urban areas, features a high share of children, and a low percentage of the elderly. Within the Warsaw region the north-eastern parts represent such a combination (see for example the Legionowo sector on Figs. 6 and 12).

The second case, with high shares of both the 0–19 and 60 plus age categories is exemplified by those units that have experienced a relatively high fertility rate during the recent past (for example, the communes of Zakroczym, Góra Kalwaria, Wiązowna – see Fig. 12).

The third pattern, with a low percentage of children and a high percentage of the elderly among the total population, is considered as typical for older, stagnating urban regions. Such a pattern is found in the downtown of Warsaw (the core) and also in typical outmigrational areas in the rural parts of the Kampinos sector in the outer ring.

The fourth pattern represents areas with relatively low shares in the total population of both the 0–19 and 60 plus age groups. These areas are typically lagging in their demographic growth, as is the case of the left bank districts of Wola and Ochota.

When one compares the age distribution in the core with the total Warsaw urban region, the core area features a high under-representation of children and an over-representation of the elderly.

5. CONCLUSIONS

The process of spatial population development in the Warsaw urban region is of a cyclical nature. Starting from 1948–1950, the changes in the proportions of population increase between the core and the remaining parts of the region oscillated over time. These trends can be interpreted with reference to the basic components of population change – natural increase and net migration, as well as policy-related factors. The future implications of the observed demographic patterns in the Warsaw region, were explored by P. Korcelli (1987) who used the multiregional model developed by A. Rogers (1975).

In the paper another important demographic dimension, namely, the age composition of the population was discussed. The patterns for the Warsaw region were found to follow rules typical for large urban areas in terms of the age distribution between the core, the inner and the outer ring of the region.

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PROBLEMS OF THE RECENT POPULATION DEVELOPMENT IN TIROL

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1. INTRODUCTION: THE TIROL'S POSITION IN THE LONG-TERM POPULATION SHIFT IN AUSTRIA

Regional variations in the population development in Austria are distinct and clearly related to the regional economic change as well as the behavioural adaptation processes typical of contemporary industrial societies. Before the First World War, the eastern parts of Austria were characterized by long-term high population growth. After 1918, Vienna lost its position as capital of the Austrian–Hungarian Monarchy. Ever since, rates of the population growth in the eastern parts of Austria have remained behind those of the western provinces (*Bundesländer*) (Table 1).

The Second World War caused another discontinuity in the population development in Austria. Since then, the population has been growing much faster in the western provinces than in the remaining parts of the country. This shift is due to both migration and natural increase. During, and after the Second World War, the western provinces were the favourite destination of resettlers from South Tirol and of refugees from the eastern parts of central

TABLE 1. Average annual rates of change in the number of inhabitants in the Austrian provinces (*Bundesländer*) per thousand, 1869–1988

Period	Burgenland	Carinthia	Lower Austria	Upper Austria	Salzburg	Styria	Tirol	Vorarlberg	Vienna	Austria total
1869–1880	+5.5	+ 2.7	+6.1	+ 2.8	+ 6.0	+6.9	+ 3.1	+. 4.0	+23.0	+ 8.9
1880–1890	+4.4	+ 3.7	+5.0	+ 3.4	+ 5.9	+6.3	+ 2.1	+ 7.8	+20.6	+ 8.8
1890–1900	+3.5	+ 1.9	+7.7	+ 3.0	+10.5	+7.1	+ 6.4	+10.7	+21.2	+10.3
1900–1910	−0.1	+ 7.8	+8.4	+ 5.1	+10.8	+7.6	+13.4	+11.8	+16.3	+10.2
1910–1923	−1.6	− 0.0	+0.1	+ 2.1	+ 2.8	+1.7	+ 2.3	− 2.9	− 6.3	− 1.3
1923–1934	+4.3	+ 7.9	+1.1	+ 2.7	+ 8.9	+3.3	+ 9.7	+ 9.5	+ 0.1	+ 3.1
1934–1939	−7.9	+ 5.4	+1.2	+ 5.0	+ 9.1	+0.0	+ 8.3	+ 3.7	−17.3	− 3.2
1939–1951	−3.5	+10.9	−3.2	+14.8	+20.0	+7.4	+13.4	+16.7	− 7.6	+ 3.4
1951–1961	−1.9	+ 7.2	−1.9	+ 2.0	+ 5.9	+2.5	+ 8.8	−15.6	+ 0.7	+ 2.0
1961–1971	+0.5	+ 6.2	+3.3	+ 8.3	−15.4	+4.9	+16.2	+20.2	− 0.5	+ 5.7
1971–1981	−0.9	+ 1.8	+0.5	+ 3.2	+ 8.8	−0.7	+ 7.4	+ 9.6	− 5.6	+ 0.8
1981–1988	−1.7	+ 1.3	+0.1	+ 3.3	+ 6.9	−0.8	− 6.5	+ 5.6	− 4.1	+ 1.2

Source: ÖStZ (= Österreichisches Statistisches Zentralamt): Volkszählung 1981 – Wohnbevölkerung nach Gemeinden (revidierte Ergebnisse) mit der Bevölkerungsentwicklung seit 1869, Beiträge zur Österreichischen Statistik 630/1A, Wien 1983.

Europe. Those inmigrants became very active economically in their new homeland and promoted modern structural changes. Also, the western provinces were favoured economically due to their geographical situation. Whereas the trade relations with the adjoining eastern part of central Europe were drastically reduced for eastern and southern Austria, the western provinces profited from the increasing interaction with the dynamic economy of southern Germany in the north and northern Italy in the south (Table 2).

TABLE 2. Average annual rates of population change of the Austrian provinces (*Bundesländer*), 1971–1988: natural increase and migration

Province	Annual changes 1971–1981 per thousand due to			Annual changes 1981–1988 per thousand due to		
	natural increase	net migration	total change	natural increase	net migration	total change
Burgenland	−0.2	−0.7	−0.9	−1.4	−0.3	−1.7
Carinthia	+2.8	−1.0	+1.8	+1.8	−0.5	+1.3
Lower Austria	−1.9	+2.4	+0.5	−1.6	+1.7	+0.1
Upper Austria	+2.5	+0.7	+3.2	+2.9	+0.4	+3.3
Salzburg	+4.7	+4.1	+8.8	+4.4	+2.5	+6.9
Styria	+0.9	−1.6	−0.7	+0.3	−1.1	−0.8
Tirol	+5.7	+1.6	+7.4	+5.0	+1.5	+6.5
Vorarlberg	+8.7	+0.9	+9.6	+6.8	−1.2	+5.6
Vienna	−7.4	+1.8	−5.6	−5.7	+1.6	−4.1
Austria	−0.1	+0.9	+0.8	+0.1	+0.7	+0.8

Source: ÖstZ, Volkszählung 1971 and 1981 and Fintl (1989).

During the two recent decades, the general trends of the post-war period have continued. The number of inhabitants in the western states grew more quickly than in the eastern and southern regions. In comparison to the 1961–1971 decade, the growth rates slowed down due

Fig. 1. The political districts (*Bezirke*) of the Tirol

to decreases in inmigration, as well as to small natural increase. While the natural population change was negative in the recent decade, in the eastern regions of Austria, the western provinces still had modest excess of births over deaths.

2. THE TIROL'S DELAYED ADAPTATION TO THE BEHAVIOURAL PATTERNS OF THE INDUSTRIALIZED SOCIETY

The western Austrian provinces and South Tirol have relatively high birth rates not only in comparison with the rest of Austria, but also with the adjoining regions north and south of the Alps. This exceptional position underscores the belated adaptation to modern behaviour patterns, the phenomenon which can also be demonstrated by other indicators. The delay of modern structural change is clearly indicated by the high percentage of population in agriculture which decreased very slowly until the end of the Second World War. In 1951, a quarter of the total population was still employed in the primary sector (Table 3).

This slow transformation in the initial periods of the industrial era is characteristic of the peripheral central European regions in which strong industrial impulses were lacking at the time of rapid industrial expansion in Germany, and in which the economic crisis of the

TABLE 3. The percentage of population in the agricultural sector in the political districts (*Bezirke*) of Tirol, 1910–1981

District	1910	1923	1934	1951	1961	1971	1981
Innsbruck–Stadt	1.4[a]	1.2[a]	3.5	2.1	1.3	0.8	0.6
Imst	72.9	66.2	55.5	40.3	26.1	11.7	5.2
Innsbruck–Land	41.4[a]	37.9[a]	36.8	25.1	17.6	9.3	4.3
Kitzbühel	55.9	52.9	47.4	31.6	26.9	17.2	10.5
Kufstein	45.3	41.9	37.3	26.9	19.9	13.1	8.5
Landeck	62.0	51.7	46.7	31.4	25.3	12.1	5.2
Lienz	59.5	57.4	55.6	43.0	34.6	23.6	13.3
Reutte	65.7	56.9	45.9	31.5	21.8	8.0	3.5
Schwaz	52.2	49.1	45.3	32.4	23.7	14.8	9.1
Tirol	44.4	40.0	35.2	25.6	18.6	10.7	6.1

Sources: 1910: k.k. Stat. Centralkomm., Berufsstatistik nach der Volkszählung 1910, Österr. Stat. NF, 3, 7; 1923: Berufsstatistik f. Tirol, in: Stat. Nachrichten 4, 1926, 247–49; 1934; Bundesamt f. Statistik, Ergebnisse der österreichischen Volkszählung 1934, Heft Tirol, Wien 1935; 1951: ÖStZ, Ergebnisse der Volkszählung 1961 Heft Tirol, Wien 1961; 1971: ÖStZ, Ergebnisse der Volkszählung 1971 Heft Tirol, Wien 1973; 1981: ÖStZ, Volkszählung 1981, Hauptergebnisse II Tirol, Wien 1985.

[a]These data refer to districts as before 1938.

1930s hindered change. Regional differentiations were stronger after 1945 when the agrarian population decreased more rapidly.

Peripheral regions, especially East Tirol, were affected by the decrease later. Up to 1981 the percentage of the population in agriculture dwindled to 6%; even in East Tirol, according to the recent census, the percentage dropped to 13%. Despite the decrease, representatives of the agrarian population still influence Tirolean politics to a considerable degree. This is because a large number of blue- and white-collar workers from a rural background still feel attached to traditional agrarian values. Since the decrease in the number of agrarian population has occurred quite recently, the traditional demographic behaviour patterns in the Tirol have been retained for a remarkably long time. Birth rates have remained at a level considerably higher than in older industrialized regions of central and western Europe. This has led to a notable

TABLE 4. Population development of Tirol by political districts (*Bezirke*), 1951–1981

Districts	Natural increase (%)			Net migration (%)			Total change (%)		
	1951–61	1961–71	1971–81	1951–61	1961–71	1971–81	1951–61	1961–71	1971–81
Innsbruck-Stadt	+ 1.5	+ 4.7	+0.4	+4.4	+9.7	+0.7	+ 5.9	+14.4	+ 1.1
Imst	+14.7	+16.5	+9.2	−3.9	−1.1	+1.3	+10.8	+15.4	+10.5
Innsbruck-Land	+10.9	+15.6	+8.2	−0.6	+8.0	+8.0	+10.3	+23.6	+16.2
Kitzbühel	+12.2	+15.5	+5.9	−3.7	+1.1	+1.0	+ 8.5	+16.4	+ 6.9
Kufstein	+11.3	+14.2	+6.1	−4.3	+2.9	+2.5	+ 7.0	+17.1	+ 8.6
Landeck	+13.4	+17.8	+8.7	−5.7	−3.6	−3.3	+ 7.7	+14.2	+ 5.4
Lienz	+15.0	+16.4	+7.6	−5.6	−5.6	−3.5	+ 9.4	+10.8	+ 4.1
Reutte	+ 9.0	+11.1	+5.9	−1.4	+3.5	−0.9	+ 7.6	+14.6	+ 5.0
Schwaz	+12.7	+15.9	+8.4	−3.0	+2.7	+0.2	+ 9.7	+18.6	+ 8.6
Tirol	+ 9.8	+13.1	+6.0	−1.6	+3.7	+1.7	+ 8.2	+16.8	+ 7.7

Sources: 1951–1961 and 1961–1971 evaluations of the official population statistics by collaborators of the research project "Tirol-Atlas", Dept of Geography, Univ. Innsbruck; 1971–1981; ÖStZ, Volkszählung 1981, Wohnbevölkerung nach Gemeinden (revidierte Ergebnisse), Beiträge zur Österr. Statistik 630/1A, Wien 1983.

excess of births over deaths, which has been the main component of population growth (Table 4).

The distinct effects of urbanization are evident in the regional pattern of natural population change. This can be seen in the comparison of Innsbruck with the rural districts. In the Tirol's capital, the excess of births has always been significantly lower. In the 1951–1961 period, net changes were only slightly positive. The excess of births by almost 5% in the 1961–1971 period was connected with the strong inmigration of young employees. Since the beginning of the 1970s, the birth and death rates have been roughly balanced. Up to the beginning of the 1970s, the excess of births in rural districts remained high. Statistics indicated that the birth rate even increased in the 1961–1971 period as compared with that of 1951–1961. The increase was connected not so much with demographic behaviour as with the age structure of the resident population. During the period, the very large age group of those born during the war established families, hence causing birth rates to increase;[1] many rural communities experienced birth rates of 25 to 30 per thousand. Out of rural districts, it was only Ausserfern (the district of Reutte) that showed lower figures. Due to its close contacts with Bavarian Algavia (Allgäu), the overall social change affected this peripheral district in the extreme north-west of Tyrol rather early.

After 1971, demographic behaviour changed. Fertility decreased sharply also in the rural districts, and disparities between urban and rural populations were reduced, especially after 1981. Due to the relatively favourable age structure, the Tirol can expect a positive rate of natural increase also in the future (Sauberer 1989). Statements concerning the future development of migration are much more difficult. Since the Second World War, migration patterns have changed. The migrational losses in all rural districts and the gains in the city of Innsbruck in the 1951–1961 period are one aspect of population shifts immediately after the war. Since the beginning of the 1960s, migration has been the function of the distribution of employment in the Tirol. This led to losses in the peripheral districts of Lienz and Landeck, in contrast to the gains in the central district of Innsbruck–Land, as a consequence of both migration to the outskirts of the city from its core and inmigration from more distant communities. The considerable migrational gains of the city of Innsbruck during the 1961–1971 decade are closely related to the government policy regarding the construction and renting of housing. During the 1960s, two large residential districts were developed on the outskirts, Reichenau and the Olympic Village, which today house about one fifth of the population of Innsbruck. The 1970s and the beginning of the 1980s saw the implementation of smaller housing projects, e.g. the "Peerhöfe" residential complex, which was designed for some 3000 people and was completed for occupancy in 1986.

The differences between districts with divergent structures indicate that the processes of migration and the related population dynamics are very complex phenomena. They are greatly influenced both by the availability of employment and the residential preferences of people.

3. DEVELOPMENT OF POPULATION AS DEPENDENT ON THE ALTITUDE OF THE MOUNTAINS

Changing regional conditions led to major shifts in demand for labour and had a considerable influence on the regional population dynamics. They cannot be shown clearly in the context of the recent changes, since the 1991 census results are not yet available. In the past, however, the transition from agrarian to industrial and service-oriented society led to the increased concentration of population in urban centres. On the basis of this, an attempt was

[1] Institut für Landeskunde, Universität Innsbruck, Tirol-Atlas map J 41–44.

TABLE 5. Changes in resident population, 1971–1981 (per cent), based on political districts and altitudes above sea level

District	Type of change	Altitude of communities						
		up to 600 m	600–800 m	800–1000 m	1000–1200 m	1200–1400 m	above 1400 m	Total %
Innsbruck-Stadt	1	+ 1.1	–	–	–	–	–	+ 1.1
	2	+ 0.4	–	–	–	–	–	+ 0.4
	3	+ 0.7	–	–	–	–	–	+ 0.7
Imst	1	–	+10.1	+11.7	+10.6	+ 5.6	–	+10.5
	2	–	+ 8.4	+ 7.6	+13.6	+12.1	–	+ 9.2
	3	–	+ 1.7	+ 4.1	– 3.3	– 6.5	–	+ 1.3
Innsbruck-Land	1	+13.2	+20.5	+17.6	+ 8.6	+11.3	+10.2	+16.2
	2	+ 4.1	+ 8.9	+10.7	+ 8.0	+13.7	+10.9	+ 8.2
	3	+ 9.0	+11.6	+ 6.9	+ 0.6	– 2.4	– 0.7	+ 8.0
Kitzbühel	1	+13.8	+ 6.6	+ 6.2	–	–	–	+ 6.9
	2	+ 6.1	+ 5.8	+ 6.3	–	–	–	+ 5.9
	3	+ 7.7	+ 0.8	– 0.1	–	–	–	+ 1.1
Kufstein	1	+ 7.9	+12.1	+ 7.6	–	–	–	+ 8.6
	2	+ 4.9	+ 9.2	+10.8	–	–	–	+ 6.1
	3	+ 3.0	+ 2.9	– 3.2	–	–	–	
Landeck	1	–	+ 6.5	+ 2.3	+ 7.1	+ 6.8	+ 9.9	+ 5.4
	2	–	+ 3.8	+ 7.8	+10.6	+10.3	+10.4	+ 8.7
	3	–	+ 2.7	– 5.5	– 3.5	– 3.5	– 0.5	– 3.3
Lienz	1	–	+ 5.0	+ 6.3	+ 3.4	+ 1.8	+ 0.2	+ 4.1
	2	–	+ 5.4	+11.5	+ 9.1	+ 9.1	+ 7.3	+ 7.6
	3	–	– 0.3	– 5.2	– 5.7	– 7.3	– 7.1	– 3.5
Reutte	1	–	–	+ 5.4	+ 5.7	– 5.0	–16.1	+ 5.0
	2	–	–	+ 6.0	+ 6.2	+ 2.8	+ 2.5	+ 5.9
	3	–	–	– 0.6	– 0.5	– 7.8	–18.6	– 0.9
Schwaz	1	+ 8.7	+ 8.7	+12.1	+ 9.1	+ 2.7	–	+ 8.6
	2	+ 7.3	+11.3	+11.7	+ 7.0	+ 8.3	–	+ 8.4
	3	+ 1.4	– 2.6	+ 0.4	+ 2.1	– 5.6	–	+ 0.2
Tirol	1	+ 5.4	+11.3	+ 9.9	+ 7.0	+ 4.6	+ 7.2	+ 7.7
	2	+ 3.0	+ 7.5	+ 8.7	+ 9.3	+10.0	+ 9.6	+ 6.0
	3	+ 2.4	+ 3.8	+ 1.2	– 2.3	– 5.4	– 2.4	+ 1.7

1 – total change of the residential population (%), 2 – natural increase, 3 – net migration

Source: ÖStZ, Volkszählung 1981, Wohnbevölkerung nach Gemeinden (revidierte Ergebnisse), Beiträge zur Österreichischen Statistik 630/1A, Wien 1983.

made to explain development tendencies in the areas situated at various altitudes in the mountains (Lichtenberger 1979).

In a mountain area such as the Tirol, the marginal locations have tended to be strongly influenced by the decline of the traditional agriculture. The crisis of mountain farmers at the beginning of the industrial era (Lichtenberger 1965) led to a noticeable decrease in population near the upper boundary of the settlement. These processes were referred to in literature as *Höhenflucht* (i.e. the "flight from high altitudes"; Ulmer 1935) or *Bergflucht* (i.e. "flight from the mountains"; Leidlmair 1975). Between 1880 and 1910, the population in the Tirol started to decrease above the altitude of 1100 m above sea level.

The movement away from higher mountains ceased in the inter-war period; since 1945, increase in population has been characteristic of most high-altitude communities. For

example, the number of inhabitants in the high mountain regions of North and East Tirol increased by 6% between 1951 to 1961, and even by 15% between 1961 to 1971. The reversal trend is generally attributed to the intensive development of modern tourism in the Alps. On the other hand, the long-term population increase at the "valley level" is attributed to the continuous increase in the importance of commercially oriented settlements (Leidlmair 1975) (Table 5).

The number of inhabitants of most high-altitude communities has increased recently. It decreased clearly at the upper boundary of the settlement only in the district of Reutte. The decrease conforms with the decline in the mountain agriculture in those peripheral regions which were early affected by strong social change as a consequence of their proximity to Bavarian Algavia (Allgäu) (Greif and Schwackhöfer 1979).

While in other parts of the Tirol the growth rate in the 1971–1981 period for the "mountain farmers' level" was slightly lower than that for the "valley communities", the number of inhabitants increased clearly at the higher altitudes, with the increases due to a proportionally high excess of births over deaths.

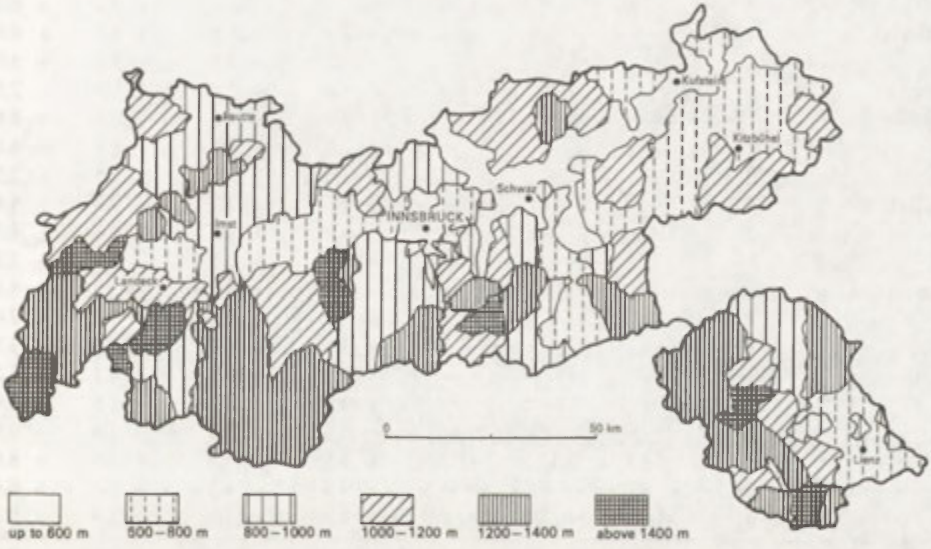

Fig. 2. Altitudes in the Tirol by communities (*Gemeinden*)

4. THE FURTHER SPATIAL POPULATION CONCENTRATION

The number of inhabitants on the lower altitudes increased above the average during the industrialization period. Communities situated in the valleys were offering employment in secondary, tertiary and quaternary sectors. This led to a considerable concentration of the population at valley level. The question, however, arises whether or not these tendencies are still valid. These trends are reflected by data in Table 6. The table discriminates between "central communities", i.e. those within the urbanized region of Innsbruck, and "other" communities, in which central places of the middle level (range 4–6; Fesl and Bobek 1983, Table 27) and the neighbouring communities of these settlements are selected and studied separately (Table 6).

The urbanized region of Innsbruck shows even today a population growth above the average. Different tendencies can be seen in individual zones of this area. As in most urbanized

TABLE 6. The changes in resident population, 1971–1981, as percentage of 1971, by political districts and types of communities

Political district	Type of change	Urbanized region of Innsbruck			Other central places	Neighbouring communities of other central places	Other rural communities	Total
		core area	surrounding area	total				
Innsbruck-Stadt	1	+ 1.1	–	+ 1.1	–	–	–	+ 1.1
	2	+ 0.4	–	+ 0.4	–	–	–	+ 0.4
	3	+ 0.7	–	+ 0.7	–	–	–	+ 0.7
Imst	1	–	+21.0	+21.0	+13.4	+11.7	+ 8.7	+10.5
	2	–	+ 7.2	+ 7.2	8.3	7.6	9.8	+ 9.2
	3	–	+13.7	+13.7	+ 5.1	+ 3.9	– 1.1	+ 1.3
Innsbruck-Land	1	+22.6	+14.2	+16.9	–	–	+10.5	+16.2
	2	+ 7.0	+ 8.7	+ 8.2	–	–	8.3	+ 8.2
	3	+15.6	+ 5.5	+ 8.7	–	–	+ 2.2	+ 8.0
Kitzbühel	1	–	–	–	+ 2.3	+21.6	+ 6.5	+ 6.9
	2	–	–	–	+ 4.2	+ 8.8	+ 6.2	+ 5.9
	3	–	–	–	+ 1.6	+ 5.7	+ 1.5	+ 2.5
Kufstein	1	–	–	–	+ 4.2	+11.5	+ 9.9	+ 8.6
	2	–	–	–	+ 2.6	+ 5.8	+ 8.4	+ 6.1
	3	–	–	–	+ 1.6	+ 5.7	+ 1.5	+ 2.5
Landeck	1	–	–	–	– 2.1	+ 7.7	+ 7.3	+ 5.4
	2	–	–	–	+ 6.3	+ 4.4	+10.3	+ 8.7
	3	–	–	–	– 8.5	+ 3.3	– 3.0	– 3.3
Lienz	1	–	–	–	– 0.7	+15.5	+ 3.2	+ 4.1
	2	–	–	–	+ 1.9	+ 9.6	+ 9.5	+ 7.6
	3	–	–	–	– 2.6	+ 5.9	– 6.4	– 3.5
Reutte	1	–	–	–	+ 0.4	+10.9	+ 4.1	+ 5.0
	2	–	–	–	+ 3.9	+ 8.5	+ 5.5	+ 5.9
	3	–	–	–	– 3.5	+ 2.4	– 1.4	– 0.9
Schwaz	1	–	+13.5	+13.5	+ 6.1	+16.4	+ 7.5	+ 8.6
	2	–	+ 8.5	+ 8.5	+ 3.9	+ 9.3	+ 9.5	+ 8.4
	3	–	+ 5.0	+ 5.0	+ 2.2	+ 7.1	– 1.9	+ 0.2
Tirol	1	+ 5.6	+14.6	+ 8.5	+ 3.2	+13.4	+ 7.3	+ 7.7
	2	+ 1.8	+ 8.7	+ 4.1	+ 3.9	+ 7.5	+ 8.6	+ 6.0
	3	+ 3.8	+ 5.8	+ 4.4	– 0.7	+ 5.9	– 1.3	+ 1.7

1 – total change in resident population (% of 1971), 2 – change due to natural increase, 3 – change due to migration

Sources: ÖStZ, Volkszählung 1981, Wohnbevölkerung nach Gemeinden (revidierte Ergebniss), Beiträge zur Österreichischen Statistik 630/1A, Wien 1983; Types of location of communities: urbanized region of Innsbruck, Amt für Statistik, Stadtforschung und Raumordnung, Statistischer Vierteljahresbericht der Landeshauptstadt Innsbruck 36, 4. Innsbruck 1985; central places: Fesl and Bobek 1983.

regions, the central urban area of Innsbruck offers little or no space for new buildings. Although the number of households has increased there remarkably since 1971, the total population of the city has been stagnating for about 20 years because the size of households has been reduced. The situation is similar in the town of Hall, which is also situated in the core area of the urbanized region of Innsbruck. In contrast, two neighbouring communities of Innsbruck – Völs and Rum – show the highest increase rates of all Austrian communities because of extremely large building activity. The inmigrants are mainly composed of growing families who moved from the town to the outskirts in search for more favourable housing. The immediate neighbouring communities, in which mainly allochtonous commuters live now, are already largely filled. It can be expected that the area of the highest growth rates will shift

outwards in the next ten years. This extension of settlements, which is connected with the governmental housing policies, will bring about severe problems in the core area of the urbanized region of Innsbruck in the next decades. The newly built apartments have been occupied by young, growing families. Of the owners, a corresponding one-sided age structure is characteristic. In the meantime, many children from the "new housing areas" of the early 1960s (Reichenau, Olympic Village) have moved away and the number of retired people and pensioners has considerably increased. Many facilities are lacking for this age group in these quarters. On the other hand, schools suffer from the lack of pupils.

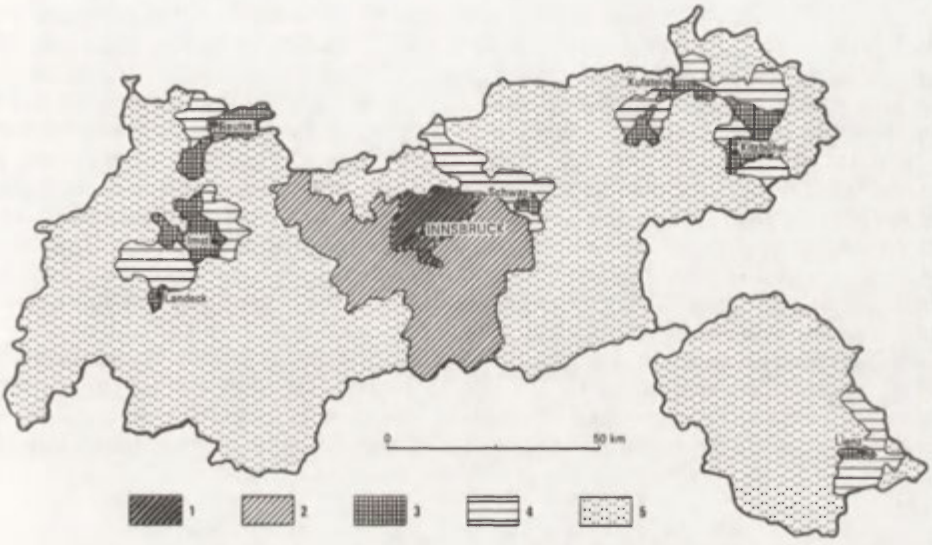

Fig. 3. Types of locations of communities in the Tirol
Urbanized area of Innsbruck: 1 – core area, 2 – surrounding area; 3 – other central places, 4 – neighbouring communities of other central places, 5 – other rural communities

Relatively strong increases have also been recently noted in those communities which were drawn into the commuting shed of Innsbruck due to the extension of the transportation infrastructure. This was especially the case of the upper Inn valley, were traffic connections have been greatly improved as a result of the construction of the motorway and the introduction of frequent (every 30 minutes) service. This explains the large recent increase in population, for example on the Mieming Plateau, which belongs to the district of Imst.

A very intensive housing development in the neighbouring communities was the price of the great increase in population. This could no longer be controlled according to spatial planning laws which became effective in the 1970s. The crucial decisions allowing very extensive construction activities had already been made earlier.

Examples of space-saving builing practices can rarely be found on the outskirts of the urban area. The insufficiently coordinated expansion of the settlement and transport has also led to a massive deterioration of the quality of the urban environment. In some cases (e.g. Innsbruck–West), motorways were built through dense housing areas, while in other places housing areas were developed after roads had been put in.

Smaller central places of rural districts show characteristics similar to Innsbruck with regard to population development. Small and middle-sized towns are, as a rule, already densely built up. In the neighbouring communities, the quality of life is better. As a result, the number of inhabitants increases exceptionally fast in those settlements, whereas central places often stagnate.

Surprisingly, the number of inhabitants of other rural Tirolian communities also increases. Their 1971–1981 growth rates are only slightly lower than the respective mean values for the districts. These favourable trends are related to the decentralization of the economic activity due to tourism and to the intensive commuting made feasible by the improvements in transportation.

5. THE IMPORTANCE OF TOURISM FOR POPULATION DEVELOPMENT

The idea that tourism has essentially contributed to the development of peripheral rural communities in the Tirol is in accord with the concept of spatial structure of leisure activities as proposed by W. Christaller (1955). The regional distribution pattern of tourism in the Tirol coincides with his model. This pattern describes a growing activity gradient when moving from the urban centres to the peripheral tourist resorts on the upper boundary of settlements.

In order to understand better the relationship between population development and tourism, the changes in the number of inhabitants were summed up according to the types of tourist communities. In doing this, the typology worked out in 1987 at the Department of Statistics of the government of the Tirol was used. It distinguishes five groups of places: (1) tourist centres (including Innsbruck), (2) tourist communities, (3) communities with dominant winter tourism functions, (4) communities with dominant summer tourism functions, (5) communities with less intensive tourism functions.[2]

The analysis of population development by type of community (Table 7) gives interesting results. The "tourist centres", even without Innsbruck, are characterized by moderate population increase. Net migration in most of those communities is even negative. The situation is slightly better in the less developed "communities with dominant winter tourism".

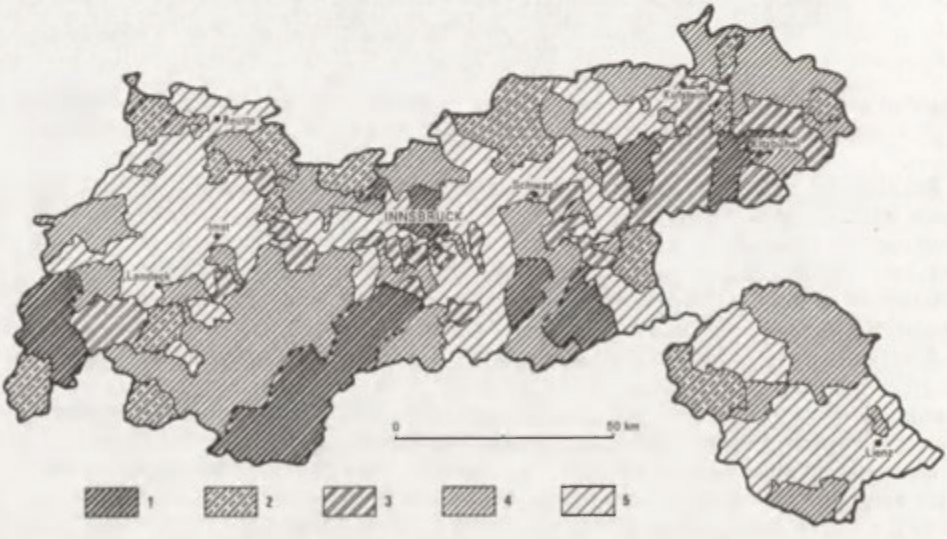

Fig. 4. Types of tourist communities in the Tirol
1 – tourist centres, 2 – tourist communities, 3 – communities with dominant winter tourism functions, 4 – communities with dominant summer tourism functions, 5 – communities with less intensive tourism functions. For sources cf Table 7

[2] For sources cf. Table 7.

TABLE 7. Changes in resident population, 1971–1981 as percentage of 1071, by political districts and type of tourist communities

District	Type of change	Tourist centres	Tourist communities	Communities with dominant winter tourism functions	Communities with dominant summer tourism functions	Communities with less intensive tourism functions	Total
Innsbruck-Stadt	1	+ 1.1	–	–	–	–	+ 1.1
	2	+ 0.4	–	–	–	–	+ 0.4
	3	+ 0.7	–	–	–	–	
Imst	1	+ 5.4	+18.2	+ 3.2	+11.8	+11.2	+10.5
	2	+11.6	+ 9.1	+ 8.0	+11.3	+ 8.0	+ 9.2
	3	– 6.2	+ 9.1	– 4.8	+ 0.5	+ 3.2	+ 1.3
Innsbruck-Land	1	+13.5	+11.5	+17.6	+16.9	+16.0	+16.2
	2	+10.4	+ 4.5	+10.8	+ 8.9	+ 7.4	+ 8.2
	3	+ 3.1	+ 6.9	+ 6.8	+ 8.0	+ 8.6	+ 8.0
Kitzbühel	1	– 0.1	+20.8	+ 8.3	+10.2	–	+ 6.9
	2	+ 2.7	+14.3	+ 6.6	+ 7.0	–	+ 5.9
	3	– 2.8	+ 6.5	+ 1.7	+ 3.2	–	+ 1.0
Kufstein	1	+10.8	+13.8	+ 9.3	+13.2	+ 6.8	+ 8.6
	2	+11.5	+ 9.2	+ 9.7	+ 5.5	+ 5.0	+ 6.1
	3	– 0.6	+ 4.6	– 0.4	+ 7.7	+ 1.8	+ 2.5
Landeck	1	+ 6.4	+ 7.1	+11.1	+ 4.4	+ 4.5	+ 5.4
	2	+ 8.0	+10.8	+15.0	+ 8.7	+ 7.3	+ 8.7
	3	– 1.6	– 3.7	– 3.9	– 4.3	– 2.9	– 3.3
Lienz	1	–	+ 0.6	+14.9	+ 4.2	+ 4.0	+ 4.1
	2	–	+ 7.2	+10.0	+10.6	+ 7.1	+ 7.6
	3	–	– 6.6	+ 4.9	– 5.3	– 3.1	– 3.5
Reutte	1	–	+ 2.7	+ 9.2	+ 8.4	+ 4.0	+ 5.0
	2	–	+ 4.4	+ 6.6	+ 8.1	+ 5.4	+ 5.9
	3	–	– 1.7	+ 2.6	+ 0.2	– 1.4	– 0.9
Schwaz	1	+ 0.9	+ 9.7	+15.6	+10.1	+ 7.7	+ 8.6
	2	+ 9.0	+ 9.3	+11.8	+10.5	+ 6.6	+ 8.4
	3	– 8.2	+ 0.4	+ 3.8	– 0.4	+ 1.1	+ 0.2
Tirol	1	+ 1.8	+ 8.9	+11.4	+10.4	+ 9.3	+ 7.7
	2	+ 1.8	+ 8.1	+ 9.1	+ 8.8	+ 6.7	+ 6.0
	3	– 0.8	+ 0.8	+ 2.3	+ 2.1	+ 2.6	+ 1.7

1 – total change in resident population (% of 1971), 2 – change due to natural increase, 3 – change due to migration.

Sources: ÖStz, Volkszählung 1981, Wohnbevölkerung nach Gemeinden (revidierte Ergebnisse), Beiträge zur Österreichischen Statistik 630/1A, Wien 1983; types of tourist communities, Amt der Tiroler Landesregierung, Sachgebiet Statistik, Typisierung der Fremdenverkehrsgemeinden, Innsbruck 1987.

However, even those communities – similar to those with "dominant summer tourism functions" – do not stand out significantly among other communities (which are hardly affected by tourism).

The "tourist centres" earlier referred to are generally communities which were early affected by tourism. Consequently, the fertility behaviour patterns typical of the agrarian society are of no importance there. The natural increase is, consequently, lower. Young people who complete schools at the secondary and tertiary level (Höfle 1984) often decide to move to places with better availability of qualified jobs. The newer tourist communities, primary those

situated at high altitudes, maintained their traditional demographic character for a long time, with a high excess of births over deaths. Young people see in tourism a good opportunity to improve their social and economic position. Whereas the heirs to farmsteads modify their farmhouses to attract tourists, others, who do not inherit the farmstead, try to build hotels or boarding houses on their father's property or to profit from tourism in some other way. Such tourist communities experienced a remarkable growth in population numbers during the 1971–1981 period, primarily caused by the high natural increase. The importance of tourism for population development should not be underestimated in the light of the foregoing discussion. Tourism is a key industry in western Austria today and it greatly influences almost all other sectors of the economy. Nevertheless, the responsible authorities should not given their attention to tourism. The future population requires a wide range of employment opportunities which should also include more jobs requiring high skills in order to prevent the selective outmigration of better trained, highly qualified people, a trend which can already be observed today in many one-sidedly developed tourist centres.

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THE PROJECTION OF THE POPULATION NUMBER AND STRUCTURE IN THE KATOWICE REGION AGAINST CURRENT DEMOGRAPHIC TRENDS

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INTRODUCTION

This paper contains a short demographic characteristic as well as projection of the population number and structure in the Katowice region*. Apart from this, the question of the consistency of the assumptions made in the projection model with the reality are taken into account. On this basis, an assessment is made concerning the possibility of treating the projection results as a demographic forecast. The analysis is based on 1983 and 1984 data.

FUNDAMENTAL DEMOGRAPHIC FEATURES OF THE KATOWICE REGION

The population number of the Katowice region in 1984 was 3 896 000, that is, for 10.5% of the total population of Poland. After the regions of Łódź and Warsaw, the Katowice region is the highest urbanized and most densely populated region in Poland (Fig. 1).

Fig. 1. The situation of the Katowice region (voivodship) in Poland

*Throughout this paper the Katowice region is defined as identical with Katowice voivodship – one of 49 administrative regions of Poland.

TABLE 1. Results of the projection performed with the use of the Rogers model on the base of the 1984 data: the Katowice region and Poland total

	Year	Population number (× 1000)	Average age	Growth index λ*	Share of the region in the total population of Poland (%)	Per cent		
						of children and youth (0–19 years)	of population in productive age (20–59 years)	of population in post-productive age (60 or over)
Poland total	1984	37 063[a]	33.25[a]	–	*	32.18[a]	54.05[a]	13.77[a]
	1989	38 608	33.59	1.0417	*	33.02	52.33	14.65
	2014	45 236	34.97	1.0302	*	31.65	51.49	16.86
	2044	52 720	34.93	1.0248	*	31.96	51.10	16.94
Katowice voivodship	1984	3 896[a]	32.26[a]	–	10.51[a]	30.66[a]	57.30[a]	12.04[a]
	1989	4 115	33.30	1.0563	10.66	31.38	56.25	13.37
	2014	5 266	35.63	1.0342	11.33	29.56	53.04	17.40
	2044	6 119	35.61	1.0294	11.61	29.45	53.92	16.63

[a]Actual data.

*The growth coefficient is calculated for five-year periods, so that the value found in the row corresponding to 1989 refers to the period 1984–1989.

Sources: own calculations on the basis of Central Statistical Office data.

TABLE 2. Age-specific rates of death, birth and migration in the Katowice region 1978 and 1984 (× 1000)

Age	1978				1984				1978 in % of 1984			
	births	deaths	inflow	outflow	births	deaths	inflow	outflow	births	deaths	inflow	outflow
0	0.000	3.711	28.760	7.622	0.000	3.223	16.287	6.148	–	115.14	176.58	123.98
5	0.000	1.445	12.418	4.087	0.000	1.208	6.195	3.544	–	119.62	200.45	115.32
10	0.210	0.719	5.718	2.356	0.490	0.614	2.934	2.197	42.86	117.10	194.89	107.24
15	17.421	0.818	11.427	4.691	20.282	0.751	6.616	3.892	85.89	108.92	172.72	120.53
20	76.179	1.042	38.251	12.486	84.636	0.917	25.743	9.799	90.01	113.63	148.59	127.42
25	53.780	1.203	33.823	9.684	60.368	1.147	20.550	8.427	89.09	104.88	164.59	114.92
30	25.915	1.638	16.054	6.055	28.754	1.561	8.518	4.763	90.13	104.93	188.47	127.13
35	10.326	2.345	7.133	3.667	11.417	2.303	4.534	3.022	90.44	101.82	157.32	121.34
40	2.486	3.883	4.522	2.687	2.220	4.094	2.466	2.002	111.98	94.85	183.37	134.22
45	0.183	6.467	3.774	2.246	0.156	6.471	1.799	1.787	117.31	99.94	209.78	125.69
50	0.000	9.209	3.418	2.201	0.000	10.457	1.784	1.582	–	88.07	191.59	139.13
55	0.000	12.260	3.654	2.427	0.000	15.152	1.893	1.696	–	80.91	193.03	143.10
60	0.000	21.813	4.590	3.637	0.000	20.904	2.121	2.026	–	104.35	216.41	179.52
65	0.000	32.710	4.946	3.560	0.000	34.719	2.694	1.965	–	94.21	183.59	181.17
70	0.000	52.840	5.417	3.575	0.000	51.467	2.681	2.270	–	102.67	202.05	157.49
75	0.000	83.571	5.565	4.703	0.000	82.184	3.448	2.973	–	101.69	161.40	158.19
80	0.000	136.303	5.903	5.668	0.000	128.841	3.888	3.185	–	105.79	151.83	177.96
85	0.000	224.004	5.712	5.565	0.000	238.154	5.252	5.310	–	94.06	108.76	104.80

Source: own calculations on the basis of Central Statistical Office data.

The population of the region is relatively balanced as far as the sex ratio is concerned, in this respect the region differs from Poland, as a whole. There were, in 1970, 102.5 women per 100 men in the Katowice region, while the national average was 106.0. The respective figures were 101.4 and 105.2 in 1980, 100.6 and 105.0 in 1982, and 102.5 and 105.1 in 1983.

A balanced sex ratio is characteristic of areas with a highly developed heavy industry and mining (like the Legnica voivodship), and of outmigration areas (the Ostrołęka, Łomża and Siedlce voivodships). In fact, important changes in the sex ratio were observed between 1982 and 1983, due to modification in the method the index was calculated by the Central Statistical Office. Namely, until 1982, the population actually living in the area was accounted for, while, since 1983, accounts were made of the population registered for permanent residence. In particular age groups, however, an important differentiation in the numbers of men per 100 women can be seen. For the most mobile age group (18–24 years), this figure is 114.8, and for the 25–29 years group, 193.0. This phenomenon can be ascribed to the attraction exerted by heavy industry and mining on a significant number of young men originating from almost the whole of Poland (Dziewoński and Korcelli 1981). Simultaneously, the Katowice region suffers from a lack of services and, therefore, also a shortage of typically female jobs.

The population of the Katowice region is somewhat younger than that of Poland as a whole. Taking the average age as a measure of the population age structure, one can see that it is lower in the Katowice region than in Poland in general (Table 1). When shares of the three basic age groups are considered (0–19, 20–59, and more than 60 years of age) it turns out that the share of the middle (i.e. the productive) age group in the Katowice region is higher than the national average, at the expense of the two extreme age groups.

There is a lower birth rate in the Katowice region than in Poland as a whole, while the mortality rates are identical. Both these indices did not undergo important changes in the 1980–1984 period (Table 2). The Katowice region has for years had a positive net migration. During the 1980–1982 period the intensity of the inflow and outflow remained at a constant quite high level. Simultaneously, there has been a systematic, though not very significant, decrease in the net inmigration per 1000 inhabitants. Beginning with 1983, there has been a breakdown in the previously observed trends. In 1984, the intensity of the inflow was almost by 1/3 smaller than in 1980, the intensity of the outflow decreased by almost 1/4, and the net migration per 1000 inhabitants – by a factor of two. The population mobility in Poland generally decreased in the 1983–1984 period in a distinct, but not abrupt way.

THE MULTIREGIONAL LIFE TABLES AND POPULATION PROJECTION

Three types of multiregional projections of population numbers and structure can be distinguished: projections with open Markov chains (Rogers 1966), projections employing cohort analysis (Rogers 1975) and projections employing accounting methods (Rees and Wilson 1977). First two of these methods treat the process of changes in population numbers and structure in particular regions through stochastic categories, while the third one – through deterministic ones.

For the purpose of the present paper the multiregional Rogers model (Rogers 1975) was used. The ideas behind this model are shown herein in an abbreviated manner, although without the description of mathematical structure, which has been presented many times in literature (Rogers 1975; Willekens and Rogers 1978; Paradysz 1981; Kupiszewski 1984).

The model construction can be subdivided into two stages. First, multiregional life tables are established with the use of the absorptive Markov chain. The tables account for the deaths and international migration appearing in each of regional cohorts, but do not account for foreign migration. The first stage ends with the determination of the growth matrix $\underline{G}$. The matrix uses both the previously calculated functions of life tables and the regional fertility coefficients.

The second stage of the model construction involves the multiregional projection of the population numbers and structure, obtained on the basis of the formula:

$$\underline{K}^{(t+1)} = \underline{G}\underline{K}^{(t)}$$

where: $\underline{K}^{(t)}$ – the interregional population distribution at time t (time t is calculated as beginning with the initial moment of the projection),
$\underline{G}$ – the growth matrix

With time matrix $\underline{K}^{(t)}$ gets increasingly independent of $\underline{K}^{(0)}$ and depends more strictly on $\underline{G}$. For $t \to \infty$ a stable population is obtained i.e., such that its age structure in individual regions does not change over time and increases with the growth coefficient λ identical for each region.

For purposes of the concrete runs of the projection model, some assumptions are adopted. It is stipulated that migration probability depends only upon the age, residence location and migration destination of a migrant, while the birth, mortality and outflow coefficients are constant over time, and there are no foreign migrations.

The projection reported here was carried out for the 13-region setting, designed by K. Dziewoński and P. Korcelli (1981); again the analysis of the results presented concerns only the Katowice region. The advantage of the multiregional projection as compared with the bi-regional projection (the Katowice region versus the rest of Poland) is that it considers relatively numerous differentiated regions instead of the one internally heterogeneous region of "the rest of Poland".

SPATIAL PATTERNS OF MOBILITY AND FERTILITY

An interesting concept of multiregional demography was coined with the introduction of multiregional life tables (Rogers 1973). The tables, treated as generalizations of uni-regional life tables, contain the expected life duration of the inhabitants of a given region, allocated to all regions. The tables contain information as to how many years a person born in region j will spend in the region i. Figure 2A presents the number of years spent on the average in each of the regions by a person born in the Katowice region, and Figure 2B the number of years spent in the region by persons born in other regions.

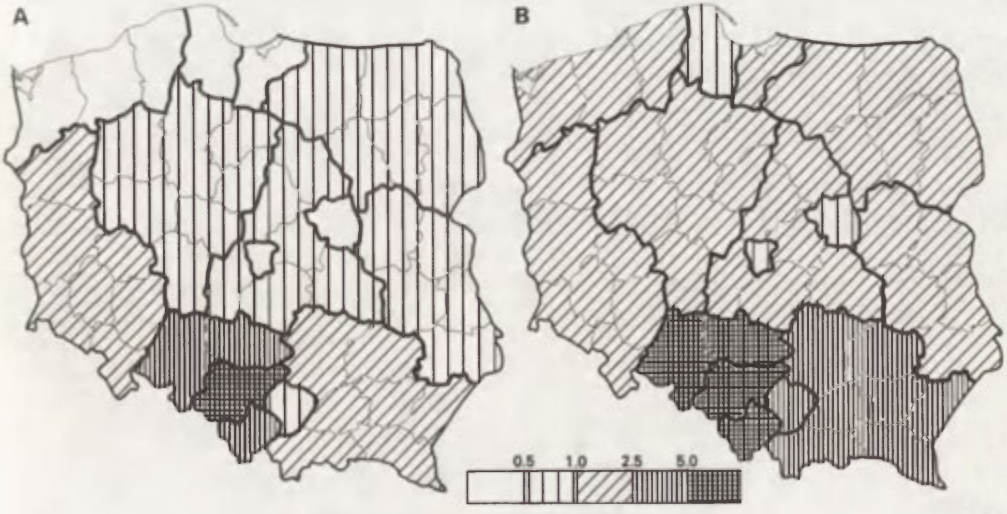

Fig. 2. Spatial allocation of life time
A – average number of years to be spent in each region by a person born in the Katowice region,
B – average number of years to be spent in the Katowice region by place of birth

The Katowice region similarly to other urbanized regions, has high values on the diagonal of the multiregional life tables. This means that a person born in this region will, on an average, spend more years in this region than people born in other, less urbanized regions will spend in the regions of their birth. Persons born in the Katowice region spend most of the time, with the exception of the region of their birth, in the Southern region (the Bielsko – Biała, Częstochowa and Opole voivodships). There are also, even though somewhat weaker, connections of the Katowice region with the South-eastern (Nowy Sącz, Krosno, Przemyśl, Rzeszów, Tarnów, Kielce, and Tarnobrzeg voivodships) and the Western regions (the Gorzów Wielkopolski, Zielona Góra, Jelenia Góra, Legnica, Leszno, Wrocław, and Wałbrzych voivodships). Connections with the coastal regions, as well as Warsaw and the Łódź regions are very weak. Weaker than expected are the connections of the Katowice region with the urban Cracow region; a person born in the Katowice region will spend on the average 0.66 years in the Cracow region. In general, the population of the Katowice region will spend statistically much less time in other regions of Poland than will the population of those regions in the Katowice region, which means that in the period analyzed the Katowice region is a net migration gainer. Persons born in the Southern region will spend the longest time in the Katowice region, followed by the inhabitants of the Cracow region and the South-eastern region, while the inhabitants of the Warsaw, Łódź and Gdańsk voivodships will spend the smallest fraction of their life in the Katowice region.

Starting with the population characteristics contained in the multiregional life tables, A. Rogers (1975) developed – as a generalization of the net reproduction index – the matrix of spatial net reproduction indices. An element of that matrix, located in *i*-th row and in *j*-th column provides information on how many children will be born in region *j* by a woman originating from region *i*. When calculations are performed for the total population (men and women), the indices assume a somewhat different interpretation. Namely, they give the number of children born, on an average, in region *j* per one person born in region *i*. This matrix, therefore, provides an insight into the interdependence between spatial mobility and the fertility of the population. Figure 3A shows the numbers of children born in individual regions by a person originating from the Katowice region. This map could then be interpreted

Fig. 3. Number of births by place of mother's birth and place of birth of child
A – regional distribution of average number by births by mother born in the Katowice region,
B – average number of births in the Katowice region by mother's birth place

as an illustration of the allocation to individual regions of the total number of births per one inhabitant born in the Katowice region.

Figure 3B presents the average number of children born in the Katowice region by persons originating from individual parts of Poland. The highest number of births per one inhabitant of the Katowice voivodship can be expected from persons originating from the Southern region, which has very strong migrational links with the Katowice voivodship, and from the South-eastern region, having strong connections with the Katowice voivodship together with high fertility indices of the region of his origin. There are also relatively strong relationships with the Western and middle-Western regions (the latter composed of the Kalisz, Poznań, Piła, Bydgoszcz, Toruń, Włocławek, and Konin voivodships). The links with the Warsaw, Łódź and Gdańsk regions are the weakest. This fact results from both the low intensity of migrational links and the low fertility indices in these highly urbanized regions. The figure obtained for the Cracow region is also lower than expected, this is probably mainly due to the migrational flows being lower than anticipated, see Figure 2A.

The index specifying the number of children per 1 inhabitant of a given region born on an average in the Katowice region can be interpreted as a specific measure of the spatial interactions occurring between the Katowice region and the other regions. According to the basic assumptions of the model, this index depends upon the intensity of migration and the age structure of migrants who adopt the childbearing patterns of their new residence region.

All the maps (Figs 2A, 2B, 3A, 3B) indicate a very similar setting of interactions: strong links between the Katowice region and the Southern region, and only slightly weaker links with the South-eastern region. There are also clear mutual dependencies between the Katowice region and the Western region. On the other hand, there is a lack of significant links with the Warsaw and Łódź regions. The Gdańsk region has somewhat stronger links than could be anticipated on the basis of sheer distance. As far as the Cracow region is concerned, there is a clear asymmetry in connections directed mainly towards the Katowice region with insignificant links in the opposite direction.

THE ANALYSIS OF THE RESULTS OF THE PROJECTION OF POPULATION NUMBER AND STRUCTURE

The population number and structure in the Katowice region obtained from the projection run performed, were compared with the numbers and structure obtained for the population of the whole of Poland (Table 1) in the same projection. According to these results, the population number in the Katowice region will increase by the factor of almost two over the period accounted for in the projection. The rate of growth, as characterized by the growth index λ, is steadily decreasing from the 1.0563 for the years 1984–1989 down to 1.0294 for the years 2039–2044, so that the decline is somewhat quicker than for the growth index of the total population of Poland.

According to the results of the projection, the share of the population of the Katowice region in the total population of Poland will be very stable – over 60 years this share increases by merely 1.1%. This is quite important information since until now the Katowice region, as the largest industrial area in Poland, could profit from a steady and very significant inmigration from other regions (cf Dziewoński and Korcelli 1981). The projection result envisaging the lack of a significant increase of the share of the Katowice voivodship population in the total population of Poland was primarily conditioned by the actual decline in the population inflow to the Katowice voivodship in 1980–1984; the inmigration rate decreased during that period by almost 1/3, while the natural increase has been stable (Table 2). The decrease is related to the limitations in investment outlays, disadvantageous and constantly deteriorating ecological conditions and to the shortage of housing. Furthermore, one should not overlook the fact that from among the thirteen regions considered in the

projection, the Katowice region; had the highest migration-related population increase in 1984.

On the other hand, however, the projection results were, to some extent, influenced by a limitation of the procedure adopted, i.e. the inflow of temporary migrants to the Katowice voivodship was not taken into account. In spite of this limitation, the results of the projection indicate that if the natural and migration rates of population change, as observed in 1984, continue over a sufficiently long time horizon, this would bring significant demographic changes in the Katowice region; these changes would entail serious social and economic results. Since, however, the probability of the maintenance of stable values of natural and migration increase over a long period is low, the projection has no forecasting value.

According to the projection results, certain changes in the population structure will continue. The simplest, and synthetic measure of the changes is provided by the mean age. The projection results demonstrate that over time the population of the Katowice region will be getting older – during the period of 30 years the mean age would increase by 3 years (that is quite significant) and then remain at the same level until the stability of the system is attained. The increase mentioned would be quicker than in Poland as a whole, where in the initial year of the projection the population was somewhat older, and after 30 and 60 years of the projection somewhat younger than in the Katowice region (Table 1). The analysis of the shares of the three basic age groups (0–19, 20–59, and over 60 years) indicates that the increase in the share of the oldest age group in the Katowice region would be the fastest in all the temporal cross-sections. The share of the youngest age group during the first five-year period will be growing and then decreasing. The oscillations would not exceed 1% for all Poland and 1.2% for the Katowice region, which can be considered as an indication of high stability. Another important phenomenon pointed to by the projection results is that the decline in the share of the middle age group, the "productive" population continues. These changes were quicker in the Katowice region especially in the period 1984–2014, than in Poland as a whole, although the share of this group will remain higher in the Katowice region than in Poland in general (see Table 1).

It should, again, be emphasized that – as indicated in this paper – the projection results commented upon here can and should be treated as diagnostic parameters describing the population of the Katowice region, and that they should provide significant information and warnings for social and demographic policy. The starting point for concrete decisions should be the answer to the question whether or not it is desired that the population of the Katowice voivodship grows by about 220 000 during the years 1984–1989 and by additional 115 000 in the years 1990–2014. If the answer is no (or yes), the question of what should be done in order to change, or preserve, this development arises. Thus, one is, at this point, moving from questions of purely theoretical modelling to problems of regional development planning.

THE PROJECTION VERSUS THE FORECAST

Having at one's disposal an effective projection tool, like the Rogers model, one can try to analyse to what extent the results of the projection can be regarded as a forecast, i.e. predictions of the future population number and structure in a given region. The answer can be formulated on he basis of the comparison of results of the *ex post* projection with the *de facto* state and with other forecasts, and on the base of the analysis of the model constraints.

It is stated elsewhere (Kupiszewski 1987) that the projection at hand gives accurate results with regard to total population for the five-year period while this accuracy is lower for particular regions (the breakdown into urban and rural areas was considered there). The most important errors were noted in the first, the last, as well as the most mobile age groups. The accuracy of the projection obtained with the Rogers model was found to be higher than of the forecasts of the Central Statistical Office, prepared in the 1970s, and was comparable with the accuracy of one of the recent CSO forecasts (*Prognoza demograficzna* ..., 1981). The above

conclusions encourage the use of the Rogers model as the forecasting tool. It should be remembered, however, that the empirical results obtained for the bi-regional system, i.e. urban and rural areas (Kupiszewski 1987), cannot be generalized to encompass any regional breakdown.

It has been stated in literature that the assumptions stipulating constancy of the birth, death and migration rates, of population homogeneity and of the closed character of the system with respect to foreign migration (Rogers *et al.* 1982) are inconsistent with empirical evidence. Besides, it has been concluded (Kupiszewski 1987) that the current data concerning migration, published on the basis of registration, do not reflect real inflows adequately, since such data do not account for persons registered for definite time periods, although staying on in the region of temporary residence for frequently several, and even more than 10 years.

On the other hand, it is worthwhile considering to what extent the mentioned limitations are essential in the case presented here. The question of the stability of demographic age-specific coefficients can be considered at the start. Table 2 contains the age-specific inflow, outflow, birth and mortality rates for the Katowice region in 1978 and 1984, and figures for 1978 expressed as percentage ratios of those for 1984. The analysis of the figures presented in this table indicates that age-specific rates of natural demographic processes (births, deaths) have not been unstable over time, the differentiation did not exceed 20% in individual age groups. This does not permit the statement of stability of the rates to be made, but the scale of variability was not high.

On the other hand migration was subjected to significant transformations. There was a decline in mobility between 1978 and 1984 in all the age groups (Table 2). Inflows in 1978 constituted, for some age groups (5–9, 45–49, 60–64, 70–74), over 200% of the inflows observed in 1984, and in all age groups – except for two of them – this ratio exceeded 150%. The outflows from the Katowice voivodship decreased significantly as well, although not to the same degree as inflows. The greatest differences were observed in the oldest age groups. Thus, the hypothesis of the constancy of the coefficients of migration cannot be confirmed in this case. It is now hard to assess whether the abrupt decrease in the mobility of the population in the considered period is incidental and temporary or permanent which, in the case of the Katowice voivodship, is a very significant question.

It is assumed in the Rogers model that the probability of migration depends on the age and residence location of a given person. Thus, it would be a typical "memory lacking" process, depending uniquely on its present state, and not on previous states. Numerous empirical studies indicate that the behaviour of migrants depends on many other features, e.g. their previous migrations (Morrison 1971), various economic factors (Lansing and Muller 1967) or the evaluation of the quality of life (Cebula 1979).

In the case of the Katowice region, characterized by inflows and outflows, it seems especially significant to assess various probabilities of the migration of persons who moved to this region and who were born there. Thus, with regard to this region, the hypothesis of the population homogeneity cannot be confirmed.

Another limitation of the model is represented by the assumption that foreign migration is unaccounted for. The annual migrational losses of the Katowice region, due to foreign migration, accounted for 19.22% to 40.46% of the natural increase, and for 10.91% to 27.19% of the actual population increase in the years 1980–1983 (Table 3).Thus, one can expect that, .because foreign migration is disregarded in the projections, essential divergencies may arise between the predicted and observed population numbers. It should also be emphasized that the inclusion of foreign migration in the model constitutes a rather difficult methodological problem in the Polish case, since the size of the flows depends upon many factors which are hard to predict, including the international, political and economic situation, as well as the policies of the state authorities with respect to those wishing to leave Poland, as well as those who have done it before. Also, a large number of persons who actually emigrated during the 1980s, have not yet obtained a resident status in the countries of destination, while they, in fact, are staying on there. There is a lack of data on these migrations and their size but one can

TABLE 3. Foreign migration from the Katowice region, 1980–1983

Year	Inflow	Outflow	Net migration	Per cent	
				of natural increase	of actual increase
1980	90	7133	– 7043	23.40	12.37
1981	75	6273	– 6198	19.22	10.91
1982	73	13786	–13713	40.46	27.19
1983	119	9496	– 9377	27.12	21.43

Source: own calculations on the basis of Central Statistical Office data.

expect that the size is significantly larger than that of the emigration registered by the Central Statistical Office.

In all, it can be stated that the projection results cannot be treated as forecasted population numbers and structure for the Katowice voivodship, and can serve only as a warning forecast. This does not mean that the Rogers model cannot be used for forecasting purposes. Such a use would, however, require a modification of the model or a choice of regions so as to restrict the influence exerted by the simplifying assumptions of the model upon the obtained results. The application of the Rogers model offers the possibility of conducting the analysis of the demographic patterns observed in any region and of tracing the consequences of the petrification of this situation in any temporal cross-section, which is a valuable capacity for both research and planning purposes.

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