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RECENT PATTERNS OF SPATIAL POPULATION CHANGE IN POLAND

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CONTENTS

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MIGRATION TRENDS AND REGIONAL LABOUR MARKET CHANGE IN POLAND

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1. INTRODUCTION

At the micro-level, the main factors of internal migration in Poland have been associated with "possibilities of improvement in the economic and social position of migrants, the desire for better living conditions, and the expectation of an improved social and physical environment" (Dziewoński and Korcelli 1981, p. 29). These mechanisms were, at the marco-level, translated traditionally into the interdependence between migration and industrial/urban development. According to Dziewoński et al. (1977, p. 144): "After 1950 the magnitude and directions of internal migrations have mainly been influenced by industrialization and urbanization pocesses". Furthermore, "industrialization represented the main driving force of urban growth". Indeed, 140 out of 241 urban centres with 10 000 inhabitants or more in 1960 had at least 50 per cent of their total employment in industry and construction in 1960. (Ibid., p. 316).

The peak in internal migration flows occurred in the mid-fifties when crude migration rates amounted to 50–55 per thousand population. (Reference is made to the period since 1948, when large shifts of the population due to post-war resettlement have come to an end.) During the following decade the rates gradually declined to the level of 26-27 per thousand, as a result of the contraction of industrial investment outlays and new farm policies. Interdependence of migration and industrial change, however, still persisted. Districts with net migration gain accounted for 77 per cent of the total inmigration, 64 per cent of employment growth and 88 per cent of all new investments in industry between 1966–1970 (Stpiczyński 1972). The 1970s brought an acceleration of urban/industrial growth together with a growth of spatial mobility. Owing to administrative reform in 1974 which involved an increase in the size of basic reporting units, the latter development has not been reflected in current population statistics. Instead, migration rates during the seventies appeared to be at the same level as during the sixties. This statistical artifact has only partly been accounted for in relevant demographic and geographic literature.

Spatial policies generally followed, rather than led industrial location policies over the period under discussion. This held true with respect to the allocation of housing, transportation, and social services. Although the pull of industrial jobs as such may have been superseded, in the case of skilled and professional migrants at least, by such factors as presence of alternative employment opportunities (i.e. job mix) and educational facilities, these were not necessarily in conflict with the former factor. Still, to meet the expanding demand for labour in major industrial regions an active recruitment policy was carried on during the seventies and incentives to the prospective migrant, including transfer subsidies and instalment payments were offered by enterprises in various industrial sectors.

Thus we come to to the recent period characterized by a rapid contraction of economic activity during 1979–1982 and its gradual, although slow recuperation during 1983–1985. As might be expected, this change has resulted in a marked decline of spatial mobility in general, and of interregional migration in particular. A question to be posed in this paper is whether migrations have also become spatially reoriented and if so, to what an extent such shifts can be attributed to industrial change.

In order to set the stage for the empirical part of the paper, basic facets of internal migration in Poland, as they prevailed over the last decades, will be summarized in Section 2 and confronted with the most recent mobility trends. Section 3 will focus on migration flows within and among 49 regions over the 1975–1983 period while taking account of changing industrial employment levels in individual regions. Alternative interpretations of observed migration patterns will be sought in Section 4. Preliminary conclusions and some further questions will be listed in Section 5.

2. EVOLVING PATTERNS OF INTERNAL MIGRATION

The concept of mobility transition (Zelinsky 1971), despite its numerous limitations, allows one to place some aggregate characteristics of migratory flows within a country on a general, temporal framework. Let us briefly consider the evolving intensity and directions of internal migrations in Poland against this standard. In the development process, it is assumed, and parallel to vital revolution, countries undergo a transition from low to high and again to low overall population mobility. Along with this change the dominant direction of migratory flows shifts from rural-rural to rural-urban, urban-urban and, finally, urban-rural orientation.

The former rule fits observed data relatively well. As mentioned earlier, the post-war peak of labour migration occurred in the mid-fifties and a secondary peak in the mid-seventies. Since then migration rates have declined precipitously. The total number of registered moves dropped from 964 000 in 1978 to 805 000 in 1982, 721 000 in 1983 and 684 000 in 1984. While in 1978 every 36th Pole changed his/her residence, in 1982 – every 45th, and in 1984 – only one out of 54 did so. A question arises, however, to what an extent the mobility decline has been caused by "normal" factors, i.e. shrinking population potential of rural areas, termination of concentration processes within urban hierarchy, decreasing share of population within migration-prone ages, or, alternatively, what role has been played by "irregular" factors, in particular a breakdown in housing construction programmes of the 1970s, contraction of economic opportunities in urban vis-a-vis rural areas, and uncertainty.

Examination of temporal pattern of flows by rural/urban status offers some support to the former interpretation. The net loss of 4.5 million migrants (80 per cent of whom were between 18 – 29 years of age) for urban areas represented a rather heavy drain on the rural population. Northern regions were more heavily affected compared to the southern regions in which commuting to work from rural to urban areas was a more extensive phenomenon, and one that allowed the retaining of higher rural population densities, based on part-time farming.

The acceleration of rural-urban migrations during the 1970s generated a number of studies on patterns and consequences of outmigration and rural depopulation. Eberhardt (in print) calculated that between 1970–1978 more than four-fifth of the territory of Poland, or 1418 out of 2020 rural townships lost population in absolute terms (although the area in question contained only about a quarter of the total rural population). This trend contrasted with a one per cent annual population gain at the national level. It could not be explained by the substitution of capital for labour inputs in agriculture. The farm size structure changed little and a shortage of farm labour was observed in many of the demographically declining rural areas. Causes of outmigration

as identified by Eberhardt included the unfavourable price structure for farm versus factory products and a deficiency of social and technical infrastructure in rural areas. Other authors found that outmigration involved farm population to a greater extent than non-farm rural population; it was particulary strong in the case of smaller communities and at greater time-distances from major towns. Also, distortions of age and sex structure were felt the strongest in those areas that had experienced absolute population losses during the 1970s.

Somewhat paradoxically, once the attention of scholars and planners focused on the rural depopulation issue, the process itself took a sharp turn. Owing to contraction of overall migration rates, and rural outmigration rates in particular, the secular decline of the rural population has been arrested. Although by a very small margin, the absolute number of the rural population in Poland has been growing since 1982. This change represents most likely a temporary deviation from long-term trends; nevertheless, it calls for a reappraisal of the rules that govern rural outmigration (see also Davies 1975, for a general discussion). A question to be posed in this context is whether the shift involves population gains for stable rural areas with continuing heavy outmigration from the declining areas, or whether it brings about a more uniform pattern of change. Evolution of migration among 49 regions suggests that the latter is true. The amplitude of net migration rates, as well as of outmigration rates, declined between 1976–1989, and, even more pronouncedly from 1980 to 1984. Those regions characterized by highest migration losses in the past, still experience net outmigration, but at levels approximately one half of what they were in late 1970s. These rates in 1983–1984 amounted to approximately one third of the natural increase rates for the regions in question.

Irrespective of changing overall mobility levels, the rural areas generate a persistently high proportion of the total number of moves. Whereas the percentage of the rural population decreased from 51.7 to 40.0 between 1960–1985 (from 15.4 to 14.9 million in absolute terms) the share of rural origins remained almost constant throughout that period. During 1961–1965 rural-urban and rural-rural migrations accounted jointly for 61.6 per cent of all internal migrations; during 1966–1970 the respective figure was 65.0, in 1971–1975 – 64.3, in 1976–1980 – 58.1, and during 1981–1983 – 56.4 per cent. Of the four basic components, the initially most numerous rural-to-rural migrations were overpassed during the early 1970s by rural-urban flows, and in the late 1970s, also by urban-to-urban migrations.

It should be borne in mind that proportions between the four migration categories not only reflect the differential propensity to move, as well as the relative size of the urban and rural populations, but also depend on the nature of the areal units for which data on migrations are reported. For example, the administrative reform of 1974 involved consolidation of some 4.3 thousand communes into some 2.2 thousand townships; this shift produced a reduction in the number of reported rural-to-rural moves by an estimated one third. Data on urban-to-urban flows, on the other hand, fail to account for the bulk of intra-urban residential mobility, since only the moves between major districts of five largest cities, along with inter-urban migrations, are included in the statistics.

While taking those data limitations into account it seems fair to judge that the main phase of rural-urban migrations in Poland drew to an end around 1980. Even if spatial mobility rates do increase in years to come (and this, other things being equal, may be expected to occur during the early 1990s owing to the fact that a relatively large cohort of those born during a period of high birthrates between 1977–1984 will be entering the labour market, and the higher education system at that time), such a change is likely to involve the urban population in the first place. So far however, the urban-urban as well as rural-urban migrations have been diminishing since 1981 at a somewhat greater pace, than the total number of moves has.

Inter-urban migrations in Poland have consistently conformed to a hierarchical

pattern. An urban place of a given size was normally a net gainer in migration interaction with any smaller town, and a net loser in the exchange with any larger city. In this process, each of the following size-categories of urban places: below 5, 5–10, 10–20, and 20–50 thousand were losing, while places of 50–100 and above 100 thousand inhabitants were gaining in net terms. Where rural-to-urban and urban-to--rural flows were accounted for, all except the smallest size, i.e. below 5 thousand inhabitants category had a positive migration balance. While typical for the whole period under discussion, these relationships were calculated on the basis of 1980 data (Jerczyński and Gawryszewski, 1984). As a component of urban growth, migration balance has played a diminishing role since the early 1970s. During 1971–1976 migrations accounted for 58 per cent, during 1976–1980 – 51 per cent, in 1981 for 43 per cent, and in 1984 – 38 per cent of the total urban population growth. Contraction of rural-to-urban migration give an incomplete explanation of this rapid change. Another aspect of this is an increase of fertility rates in urban areas. GFR for the urban population grew namely from 0.872 in 1978 to 1.039 in 1983. As a consequence, urban birth rates increased despite a drop in the size of the 20–29 years population age category. The unique trend seems to be a short-lived phenomenon. Data for 1984–1985 point to a rather substantial decline of birth rates and fertility rates in both urban and rural areas.

The rule seems also to hold in the most recent period of rapid mobility decline. For example, in a 13-region system five major urban regions (Warsaw, Łódź, Gdańsk, Katowice and Cracow) have each retained net migration gains from every out of eight less urbanized regions during 1977–1984, although such gains have clearly diminished over time. However, while inmigration rates declined, the outmigration rates for the five urban regions remained relatively stable, in conformity with Lowry's (1966) generalization.

In the light of the trend presented above, the recent decline of spatial mobility of the population in Poland can not be readily interpreted within the mobility transition framework. The numerical dominance of rural-to-urban flows, along with a hierarchical pattern of inter-urban migrations, are both features of an intermediate, rather than late stage as defined in the concept under discussion. The concept, of course, is not able to account for policies which can have an effect of accelerating, or slowing down the transition. The latter effect has clearly been dominant in the case of Poland. Urban growth limitation policies, carried on during the 1960s, had their share in flattening the wave of rural-to-urban migrations and breaking it up into two crests of lower height: one it the mid-fifties and the other during the mid-seventies. Consequently, concentration within urban hierarchy was delayed due to these policies, which also implies a postponement of urban deconcentration to a more distant future.

3. MIGRATION AND INDUSTRIAL CHANGE

If, during periods of industrial employment growth, migrants were attracted towards the regions characterized by a heavy concentration of industry, then interregional variation in migration rates should be associated with the spatial pattern of industrial location. One could also anticipate such an interdependence, with a reverse sing, to hold when the size of industrial employment declines, but as Cordey–Hayes (1975) pointed out, a reduction in the number of jobs within a region is not likely to result in an increase of its outmigration rate. What it usually brings about instead is a decrease in both the inflow and the outflow of migrants. Hence, while we expect a positive association between inmigration level and the size of industrial employment at the regional scale to prevail in Poland when data for the 1970s are looked at, such an

association, one can claim, while still positive, should have lost its significance since 1979.

Instead of dealing with in-and outmigration rates which would be a more consistent approach in the present context, we shall be using a surrogate measure, i.e. net migration rates. This choice is determined by the data base in which migrations include moves both between and within individual regions. The regions are 49 voivodships (upper-level administrative units) which, with several exceptions, represent a fair approximation of functional urban regions, or, regional labour markets (see Korcelli 1977). The labour market pull is represented by the industrial employment index (number of employees in mining, manufacturing and construction per 1000 inhabitants). One might instead prefer to use the number of job vacancies in the industrial sector, but such figures were not available.

Figure 1 presents series of *r* values calculated for each year between 1975 and 1983, and, with one and two year lags, with respect to the migration variable. The first series assumes a feedback relation between industrial employment and migration to exist: since the employment figures are reported for December 31, they incorporate the effects of migrations that occurred during the given year. The lagged correlation is based on an alternative assumption according to which migrants respond not so much to industrial job vacancies (which are filled predominantly by local residents) as to jobs in other sectors within the region, both these vacated, and those generated due to multiplier effects.

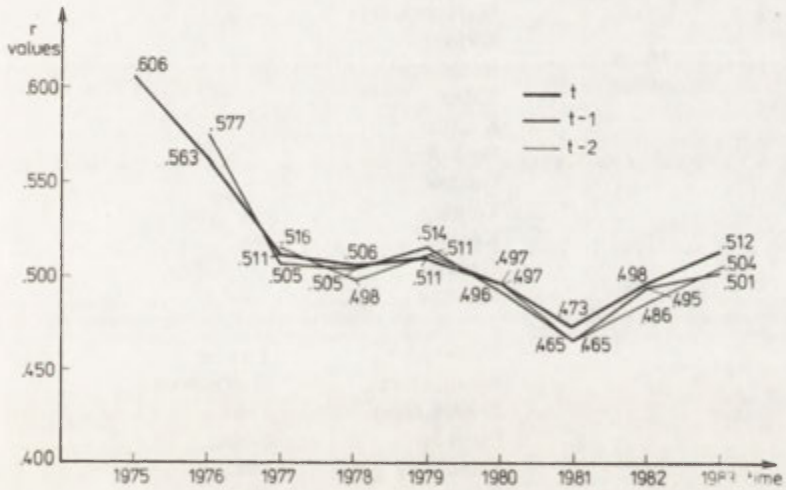

Fig. 1. Simple correlation coefficients: industrial employment index and net migration rate

The pattern of *r* values for the *t* series is basically consistent with the initial hypothesis: a positive association between the industrial employment index and net migration rate declines almost regularly between 1975 – 1981, to increase slowly again during the following years. Introduction of time lags brings no improvement to this picture but it confirms the overall direction of change.

As one might observe, the trend noted above refers to the labour market pull exerted by industrial regions, rather than industry *per se*. (The configuration of regions, when these were arranged by the industrial index value, turned out to be very stable indeed, with Spearman's coefficient of 0.95 for 1975/1982 rankings. The length of year-to-year shifts in the index value, on the other hand, may reflect differential adjustment of

enterprises in individual regions to a slow-down of growth and then a decline in the size of industrial employment at the national level. However, no significant association was found between the marginal values of the employment index and net migration (r values ranged from -0.119 to 0.263 for the eight crossections examined).

Using a two-by two contingency table the individual regions (i.e. voivodships) were arranged according to their position with respect to median rank values (see Tables 1

TABLE 1. Ranks of individual voivodships in industrial employment and net migration: 1975

Net migration rate	Industrial employment rate	
	above median	median and below
Above median	Łódź	Szczecin
	Katowice	Lublin
	Bielsk	Słupsk
	Legnica	Białystok
	Częstochowa	Koszalin
	Wrocław	Olsztyn
	Opole	
	Warszawa	
	Kielce	
	Bydgoszcz	
	Kalisz	
	Kraków	
	Poznań	
	Gdańsk	
	Toruń	
	Krosno	
	Gorzów	
	Rzeszów	
Median and below	Wałbrzych	Tarnów
	Jelenia Góra	Skierniewice
	Zielona Góra	Płock
	Piotrków	Elbląg
	Tarnobrzeg	Piła
	Radom	Chełm
		Konin
		Włocławek
		Sieradz
		Leszno
		Nowy Sącz
		Przemyśl
		Suwałki
		Siedlce
		Ostrołęka
		Zamość
		Biała Podlaska
		Ciechanów
		Łomża

and 2). It may be of interest to mark shifts experienced by some of the labour market regions between 1975 and 1982. The Upper Silesian Industrial District (Katowice region) moved from rank 2 to 1 on the industrial employment scale, and from rank 5 to 1 in terms of net migration gain per capita. Large urban regions with diversified employment structure, (including Warsaw, Cracow, Wroclaw, Poznań and Gdańsk) were situated in the uppermiddle sections of the industrial employment index and

TABLE 2. Ranks of individual voivodships in industrial employment and net migration: 1982

Net migration rate	Industrial employment rate	
	above median	median and below
Above median	Katowice	Gorzów
	Łódź	Lublin
	Bielsko – Biała	Słupsk
	Legnica	Białystok
	Opole	Piła
	Piotrków	Olsztyn
	Wrocław	Leszno
	Zielona Góra	Koszalin
	Bydgoszcz	
	Rzeszów	
	Krosno	
	Kalisz	
	Warszawa	
	Toruń	
	Kraków	
	Gdańsk	
	Poznań	
Median and below	Wałbrzych	Płock
	Jelenia Góra	Tarnów
	Częstochowa	Konin
	Kielce	Skierniewice
	Tarnobrzeg	Elbląg
	Radom	Włocławek
	Szczecin	Chełm
		Sieradz
		Nowy Sącz
		Przemyśl
		Ostrołęka
		Suwałki
		Siedlce
		Ciechanów
		Zamość
		Biała Podlaska
		Łomża

occupied top ranks on the net migration scale. However, each of these regions moved down the industrial employment scale between 1975 and 1982, and three out of five – down the net migration scale. As to the latter, the most notable was the decline of the position of Gdańsk – from second to eighth rank. Some older industrial districts, such as Wałbrzych, Częstochowa and Radom were characterized by net migration losses at both the beginning and the end of the period; although these rates declined between 1975 and 1982, the respective ranks remained at a low level. Conversely, the young industrial regions of Legnica and Piotrków have improved or at least retained their positions against other regions with respect to net migration rates.

4. ALTERNATIVE CORRELATES OF INTERREGIONAL MIGRATION

Since the pull of industrial labour markets has been found to account for a decreasing share of the variance of net interregional migration from 1975 to 1981, and an increasing share from 1981 to 1983, one should ask, whether this change is somehow reflected in the degree of association between the size of migration and the major push factor, i.e. demographic momentum with fertility and age-composition measures serving as its proxies.

Although it has been studied extensively, the relationship between fertility and migration is not at all conceptually clear.Hoem (1977) identifield three kinds of association between the two variables: (a) long-term macro-effects of differential fertility on population redistribution, (b) effects of migrations on fertility levels of origin and destination areas, (c) migration and parenthood as interdependent events in individual life histories. In this paper the first type of covariation is referred to. Migration is therefore interpreted as an equilibrating process within an interregional population system. Regions with high fertility are typically those with a younger population which, other things being equal, also tends to be more mobile.

In fact, instead of fertility measures, one should deal with the relative size of the 15–24 age categories. The data rarely allow, however, for the accounting of the effect of migration on the size of particular age groups within a region.

A fertility measure to be used here was chosen to be the gross reproduction rate. In a more rigorous framework the time lag between fertility and migration variables should be 15–20 years: this is not what our data allow for; the one and two year lags are actually used. They serve to generate additional trajectories for testing trend stability.

The pattern in Figure 2 resembles that of Figure 1. The r values decrease rather regularly between 1975 and 1980–1981, and increase during 1982–1983. On the first thought this result is counterintuitive, since the effect of demographic factors of migration is believed to be both stable and compensatory with respect to economic and policy factors, at times when the importance of the latter diminishes. One may come to a conclusion, however, that the strength of the demographic push is not independent of the economic pull. The dwindling attracting power exerted by industrial and urban regions has been reflected in declining migration propensities of those in age groups characterized by the highest rates of labour market entry, i.e. categories relatively over represented in the high-fertility regions. It has had less impact on the mobility rates of those already on the labour market. Another feasible interpretation is that outmigration from the regions with higher fertility levels has been disproportionately affected by changes in the age composition of the population. This might indeed be a major factor accounting for the decline of r values during 1975–1980, when smaller cohorts born in the 1960s were entering the 15–19 age category. Since this trend, however, has continued during the 1980s (birth rates reached the bottom line in 1969) such an explanation is irrelevant with respect to the period since 1981. A regionally disaggregated analysis would be required to unfold this question. As to some recent evidence,

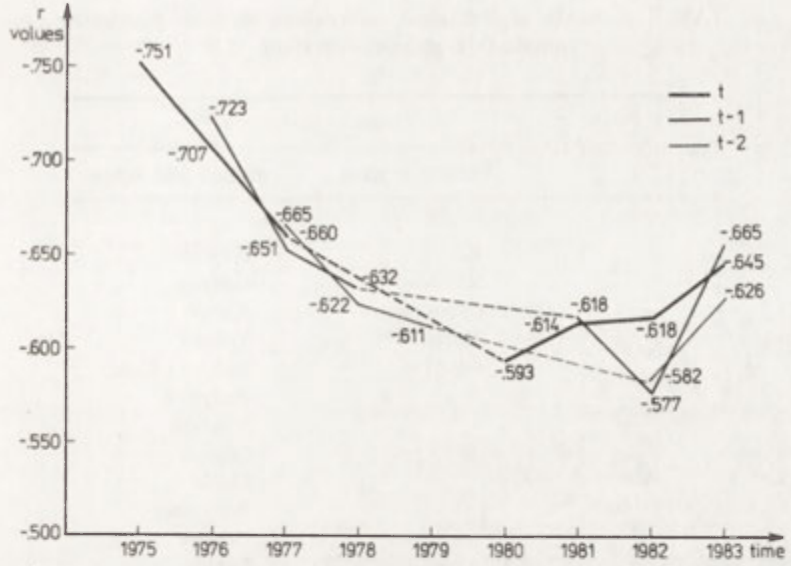

Fig. 2. Simple correlation coefficients: gross reproduction rate and net migration rate

J. Witkowski (private communication) has estimated that only slightly over one third of the observed mobility decline of the rural population is attributable to the age composition effect.

When looking at respective values for individual regions (see Tables 3 and 4) it is not surprising to find the major urban/industrial agglomerations among units with low rankings on the gross reproduction scale, and high rankings on the net migration scale at both the beginning and the end of the period. The old industrial region of Wałbrzych is an exception to this rule. With a high rate of industrial employment, low population reproduction and relatively high net outmigration level, it represents a problem area from both the physical and economic planning perspective. A conspicuous spatial feature is a rather clear-cut (with just a few exceptions) division into eastern (in particular north-eastern and south-eastern) and western part of Poland, the former displaying higher population reproduction rates than the latter. This division is not perfectly reflected in the distribution of spatial mobility rates which are particulary high in the case of north-eastern, as well as the north-western regions.

5. CONCLUSIONS

Rather than to seek a statistically significant explanation for the recent shifts in internal migration patterns in Poland, the purpose of this paper was to demonstrate the changing role of two factors considered traditionally to represent major migration correlates, i.e. spatial pattern of industry and interregional variations in fertility level. In general, our preliminary results corroborate the initial hypotheses according to which the two factors have each lost their importance during the years of economic scarcity. Many of the young prospective migrants have decided to stay on the farm or to take non-farming jobs in a rural area, that would otherwise have been frowned upon in the years of economic expansion. A few of those already living in a city have decided to return on the land. Urban life has lost some of its appeal due to the mounting housing shortage and supply limitations. Owing to the evolving age composition of the

TABLE 3. Ranks of individual voivodships in gross population reproduction and net migration: 1975

Net migration rate	Gross reproduction rate	
	above median	median and below
Above median	Krosno	Kielce
	Rzeszów	Gorzów
	Częstochowa	Kalisz
	Słupsk	Toruń
	Olsztyn	Bielsko – Biała
		Białystok
		Koszalin
		Legnica
		Opole
		Bydgoszcz
		Gdańsk
		Lublin
		Szczecin
		Poznań
		Katowice
		Kraków
		Wrocław
		Warszawa
		Łódź
Median and below	Łomża	Piotrków
	Nowy Sącz	Płock
	Ostrołęka	Zielona Góra
	Tarnów	Skierniewice
	Biała Podlaska	Jelenia Góra
	Suwałki	Wałbrzych
	Siedlce	
	Przemyśl	
	Chełm	
	Radom	
	Konin	
	Zamość	
	Tarnobrzeg	
	Ciechanów	
	Wałbrzych	
	Elbląg	
	Piła	
	Leszno	
	Sieradz	

TABLE 4. Ranks of individual voivodships in gross population reproduction and net migration: 1982

Net migration rate	Gross reproduction rate	
	above median	median and below
Above median	Krosno	Zielona Góra
	Rzeszów	Gorzów
	Leszno	Olsztyn
	Piotrków	Koszalin
	Kalisz	Bydgoszcz
		Bielsko – Biała
		Toruń
		Legnica
		Opole
		Lublin
		Białystok
		Gdańsk
		Poznań
		Katowice
		Kraków
		Wrocław
		Warszawa city
		Łódź
Median and below	Słupsk	
	Biała Podlaska	Włocławek
	Nowy Sącz	Płock
	Łomża	Skierniewice
	Zamość	Częstochowa
	Tarnów	Jelenia Góra
	Ostrołęka	Wałbrzych
	Siedlce	Szczecin
	Suwałki	
	Przemyśl	
	Tarnobrzeg	
	Radom	
	Chełm	
	Ciechanów	
	Elbląg	
	Piła	
	Konin	
	Sieradz	
	Kielce	

population, the size of the age groups characterized by high migration propensities has shrunk both relatively and in absolute terms. Thus, interregional migration trends have become controlled by constraints rather than development factors. Despite the continuing decline of spatial mobility rates, however, industrial labour markets since 1983 seem to be attracting a somewhat bigger share of those who do migrate, and migration origins are more likely again to be regions with a higher fertility.

A decline in the size of industrial employment within a region does not necessarily imply a reduction in the number of industrial jobs, as vacancies may account for the difference. Moves into jobs in other sectors, early retirement or emigration create a vacuum which is only partly filled in by the new migrants. Some industrial regions may be offering wages (and housing) high enough to attract labour from other industrial region. In this respect the division lines do not run exactly between the old and the new industrial districts, as used to be the case, but between what A. Kukliński calls "strong" and "weak" regions (see also Grzeszczyk 1985).

Of a more general scope is the question of how sensitive interregional migration patterns are with respect to changing overall mobility levels. It is generally believed that such patterns do possess a fair degree of stability; while the ampliude of migration rates diminishes, the basic relations between regions that gain and those that lose, are kept relatively constant. This rule, which is supported empirically (see: Willekens and Baydar 1983) holds true for Poland mostly on a macroregional scale. In a 13-region breakdown none of the units turned from a net gainer to a net loser or vice versa between 1978–1984 (Korcelli 1985), although such shifts were noted for individual age categories. Using the 49-regions division one finds that for as many as nine units the net migration shifted from negative to positive, or the other way around during the same period. Out of these changes three occurred between 1983–1984.

If overall mobility rates will keep diminishing over the next few years, as they are likely to, a number of regions, including major urban agglomerations, may see their net migration rates fluctuating around zero. In such a situation certain planning problems may temporarily disappear, and new spatial policy issues are certain to emerge.

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THE MECHANISM FOR MIGRATION IN POLAND

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1. SPATIAL PATTERNS OF MIGRATION IN POLAND

In the geographical investigations of migration in Poland stress has been laid on the identification of spatial patterns (Żurek 1975; Żurkowa 1980; Żurkowa and Księżak 1980), the distributions of migration rates and their relations to distance (Gawryszewski 1974, 1981) and of the age of migrants (Potrykowska 1984), as well as on migration as an interaction in the settlement system (Rykiel and Żurkowa 1981, 1984; Rykiel 1984a, 1985a). The explanation of the patterns of and the mechanism for migration has been provided as the by-effect of a discussion concerning other questions (Rykiel 1982a; Rykiel and Żurkowa 1981). On the contrary, rather successful prognoses of migration have been provided (Dziewoński and Korcelli 1981; Księżak 1984). This fact confirms the inadequacy of the classical neo-positivist view of the sequential development of science, from description through explanation to prognosis, since successful prognoses need not be preceded by the in-depth identification of the mechanism for the processes in question.

What is characteristic of the geographical perspective on migration is to view the latter, explicitly or implicitly, in the context of settlement systems. In this context, two basic concepts of the function of migration may be identified (Jagielski 1984). The first concept recognizes migration as an exogeneous system which alimentates the settlement system. The other concept recognizes migration as an endogeneous regulatory/transformatory subsystem of the settlement system. If the settlement system is defined as a set of settlements interrelated by intensive and durable socio-economic links, the question arises of whether or not migration may be recognized as a structure-creating factor of the settlement system. The point is that migration processes are rather flexible so if intensive, they are rarely durable; and if durable, they are not so intensive. From the long-run perspective, durability seems more important than intensity for the spatial structure while from the short-run perspective intensity is more important. This contradiction involves a dichotomy between the investigation of the direction and the intensity of migration *flows* and analyses of the network of migratory *relationships* (Jagielski 1984); therefore, both types of research make a contribution to the recognition of the mechanism for migration.

The question of intensity vs. durability of migration flows and migratory relationships may be illustrated by the empirical results of the investigation of the spatial patterns of migration in Poland. Within the directly managed economic system (i.e. one in which enterprises were directly controlled by orders concerning the volume of the produced goods while centrally supplied in raw materials, rather than indirectly by the economic parameters), which explicitly dominated in Poland from 1949 till 1980, and with the industry-oriented strategy of development adopted, the increase is housing supply was but a by-product of the industrial investments (Jałowiecki 1982), which were

responsible for the local deficit of labour. Investment projects produced intensive, but short-lived in-migrations to industrialised areas; those inflows were generally distance free, even though poorly developed rural areas dominated as origins. After the deficit of labour had been covered, the migration flows decreased quickly while their extent contracted to reach a regional scale, following the distance decay function (Rykiel and Żurkowa 1981). This development has been nationally valid and had also applied to largest urban agglomerations and industrial districts. A fallacy that those areas developed their nationwide migration sheds may have appeared; this, however, resulted from the fact that extensive non-disaggregated spatial units were analysed; while disaggregated, they turned out to be composed of individual towns, each of which followed the generally valid behaviour. However, under the permanent investment, the regions in question as wholes produced nationwide migration sheds which were, in fact, generated by individual industrial investment projects, and thus individual urban places, in individual points in time (Rykiel and Żurkowa 1981).

The migration pattern within the national urban system followed the explicit hierarchicality of the system (Rykiel 1984a). Considerable deformations of the pattern were involved by administrative restrictions on migration to a few largest cities; the restrictions basically deformed, however, the pattern of out-migration from those cities rather than that of the in-migration to them, i.e. contrary to what had been intended (Rykiel 1984b and 1986a). This development even strengthened the hierarchisation of the migratory and settlement systems which were dominated by one-way flows up the hierarchy (Rykiel 1985b). Within migration down the hierarchy, four components might have been identified: (1) return migrations of those who did not succeed in adaptation in the large city; (2) migrations within the functionally specialised subsystems of the national settlement system; (3) quantitatively and, especially, socially limited centrifugal migrations within urban agglomerations and city regions in searching for better environmental conditions; (4) random moves, resulted from a family situation (Rykiel and Żurkowa 1981).

2. NEO-CLASSICAL THEORIES AND MODELS OF MIGRATION

The explanation of the mechanism for migration is based on specified theories and models. The prevailing models of migration may be classified into three groups, as demographic, sociological and economic models. Demographic models of migration are based on the assumption that mobility is dependent on demographic characteristics, especially on age. Sociological models stress the motivations of migration and the investigation of the environmental perception of potential migrants. Economic models of migration stress, in turn, the economic factors underlying human migration, especially the mechanism for the labour market. While demographic models of migration have recently gained considerable recognition in Poland because of their well developed predictive framework, economic models are, unfortunately, far less known, even though their predictive framework is fairly well developed, the explanatory framework being considerably higher developed than that of the demographic models. The latter fact explains why the basic part of the present paper refers to the assumptions of the economic models. The scope of this paper is to point to the theoretical concepts on which those models are based rather than to discuss the models themselves together with their mathematical assumptions.

What is called the traditional economic theory of migration (Cordey – Hayes and Gleave 1974) refers explicitly to the tradition of the neo-classical school of political economy, especially to the general equilibrium theory. Models based on the traditional economic theory of migration refer to the push-pull concept. In the theory, migration is viewed as the equilibrating mechanism between the supply and demand on the labour

market (Forrester 1969). Population is assumed to follow the changing replacement of employment opportunities which is, in turn, involved by the changes in demand of individual goods and services (Gober – Mayers 1978). This mechanism is based on differential accessibility to jobs and differential wage rates. The system under investigation is seen as a set of regions with differential wage and unemployment rates. High unemployment and low wages push individuals whose behaviour is assumed to be economically rational, and who maximise their utility functions. The individuals are, therefore, assumed to migrate to regions with job vacancies higher than unemployment and with a high wage rate. Migration equilibrates the system by, on the one hand, the decrease in labour shortage in pull regions, which involves an increase in unemployment and a decrease in wage rates, while, on the other hand, it contributes to the decrease in labour surplus in push regions, which involves a decrease in unemployment and an increase in wage rates.

In the neo-classical models of migration, in-migration is interpreted in terms of the economic attractiveness of destinations. The attractiveness is viewed in terms of labour shortage, low unemployment and high wage rates. The main criticism aimed at the theory the models are based on, was that it was based on a deterministic chain of monocausality (Cordey – Hayes and Gleave 1974). In the traditional approach, out-migration was basically characteristic of declining regions. It was, however, found that the *per capita* gross out-migration rate is indepedent of the economic characteristics of the region and only depends on its total population (Lowry 1966). Others found, in turn, that in- and out-migration rates were strongly **direct** related (Cordey – Hayes and Gleave 1973). Thus, it was hypothesised that in advanced economies migration is directed from strength to strength rather than from weakness to strength (Cordey – Hayes and Gleave, 1974). Rogers (1978), however, proved that the positive correlation between out- and in-migration rates do not invalidate the economic push-pull theory. This implies that a typology of regional systems may be provided so that in individual systems out- and in-migration can be related positively, negatively or unrelated. What the findings of Cordey – Hayes and Gleave imply is that it is merely economic strengths that are interrelated by migration while economic weaknesses are self--contained or relatively isolated. This point was developed in the mobility theory.

In another theoretical framework, to which economic models of migration are related, migration is viewed as an investment. As such, it requires costs but, on the other hand, is expected to provide profits. Thus, the probability of migration is a function of the expected profit, i.e. the difference between output and input (Sjaastad 1962; Kau and Sirmans 1977). Interregional income differences, costs of migration, searching for a job and the costs of the searching are analysed in models of this type (David 1974), i.e. variables and processes related to the economic betterment framework (Miron 1978).

To the third group within the traditional economic approach to migration, econometric models may be included in which migration is viewed as a self-regulatory mechanism for the analysed regional system (Bergsman and Ehemann 1974; Alperovich *et al.* 1977; Kulikowski 1978; Pawłowski 1979; Kelley and Williamson 1980). Those models closely correspond with a group of models which attempt to relate demographic and economic growth submodels. These demographic submodels are aimed at providing estimates of the supply of, and the economic growth submodels of the demand for labour. A feedback relation exists between the two types of submodels. The first link corresponds explicitly with the traditional economic theory of migration in assuming that interregional migration of labour is the equilibrating mechanism which reduces the interregional imbalance between the demand for and the supply of labour. The other link is that the demand for goods and services by the population of a region induces its economic growth (Rogers and Ledent 1971; Rogers and Walz 1972).

The assumptions of the neo-classical theories and models of migration may be criticised on many grounds. Firstly, migration tends to be viewed as the only

equilibrating mechanism between the supply of and demand for labour. What this implies is the acceptance of a deterministic chain of monocausality (Cordey – Hayes Glave, 1974). Secondly, the general equilibrium theory, on which the models are based, implies that in declining regions, i.e. those with high unemployment and low wage rates, out-migration is high. This implies that the unemployed and the poor are more mobile; this was, however, generally denied on the empirical ground. A higher mobility of the poor rather than the rich can be found in rather extreme situations, mainly in the developing countries, this is, however, difficult to observe in the highly and moderately developed European countries. Thirdly, unrealistic assumptions are made of homogeneous labour, complete information and perfect mobility (Cordey – Hayes and Gleave 1974). Fourthly, narrow economistic assumptions are made. *Homo oeconomicus*, who tends to minimise costs and maximise profits, is assumed to be the only actor in the modelled regional system; however, the character has hardly ever been *homo universalis*, even in the capitalist world. Fifthly, and finally, structural unemployment takes a paramount place among the assumptions on which the neo-classical theory is based. Therefore, the theory applies deliberately to and exclusively to the capitalist labour market. Whether or not unemployment is possible under socialism, it is essential to note that in the East European countries with directly managed socialist economies structural overemployment rather than unemployment is to be found (Bobrowski 1981; Landau 1981). Yet the structural overemployment may have a different impact on migration than structural unemployment has.

3. THE MOBILITY THEORY

Two conceptual alternatives may be contrasted with the traditional economic theory of migration. Distance decay models provide the first alternative. Among them, Alonso's (1973) prototype model of a national settlement system and the concept of attractiveness, developed by Ginsberg (1972), are worthy noting. According to the latter concept, the actual, i.e. subjective, attractiveness of a region is a function of its intrinsic, i.e. objective, attractiveness and the distance of the region from the perceiver.

Distance decay models may be recognized as an alternative to the traditional economic theory of migration for, contrary to the latter, which assumes perfect mobility, they are based on the assumption that migration rates depend, as any interrelationships do, directly on the distance between interactors. On the other hand, however, in both Ginsberg's and Alonso's models, the notion of economic attractiveness plays an important part. This notion was, in fact, not explicitly defined, yet one may suppose it was understood in terms of the neo-classical economic theory, i.e. unemployment, wage rate, costs of living etc. (Rykiel 1982a). From this point of view, therefore, distance decay models provide a modification, rather than an alternative to the traditional economic theory of migration.

The mobility theory provides another, and more serious, alternative to the traditional economic theory of migration. The mobility theory integrates concepts of job vacancy, acquiring information and the expansion of the local labour market (Cordey-– Hayes 1975). The theory begins with the empirical observation that growth regions, i.e. those of high wage and low unemployment rates, are characterized by low net migration rather than high, as was expected when following the neo-classical economic theory of migration (Cordey – Hayes and Gleave 1974). The low net migration in growth regions results from their high both in- and out-migration while the neo-classical theory suggests high in-migration and low out-migration. It was also stressed that a potential migrant when considering alternative destinations does not react to employment growth *per se* but rather to job vacancies (Cordey – Hayes 1975). It may even be noted that human migration is accompanied by a migration of job vacancies in the opposite

direction (McKinnon 1975). It was also found that regional labour markets on which there are many job vacancies generally have a rapid voluntary turnover of jobs, for individuals are trying to match their differential skills and tastes to the differentiated job opportunities provided by the labour markets (Cordey – Hayes and Gleave 1974). This matching, discussed in more detail, by Oberg and Oscarson (1979), may be viewed as a stochastic learning process in which movers are gaining information not only of the local labour market but also of a more extensive one. In this way the likelihood of out-migration increases. Many job vacancies, however, also attract migrants from other regions and this fact involves an increase in the probability of in-migration. On the other hand, a small number of job vacancies leads to stagnation of the local labour market with few people changing jobs. The tightness of the labour market produces caution. Individuals are unlikely to change a job so as not to risk losing the one they have and not finding a better one instead; in this way, however, they have no opportunity to enter the learning process. As a result, occupational mobility and out-migration are low and the labour market is self-contained or relatively isolated (Cordey – Hayes and Gleave 1974). Therefore, growth regions have high in- and out -migration rates while of declining regions low in-migration and not very high out -migration rates are characteristic.

An advantage of the mobility theory is that it joins occupational and spatial mobility within a common conceptual framework. Additionally, an attempt was made to include the concept of housing vacancies to the theory (McKinnon 1975; Rykiel 1980).

Another development related to the mobility theory was the duration of stay effect or "the law of cumulative inertia" (McGinnis 1986). It was observed that recent migrants to a region are more likely to move again than are the remainder of the resident population (Land 1969; Ginsberg 1971; Cordey – Hayes and Gleave 1974). This results from the fact that over time individuals are establishing stronger and stronger networks of social ties (Johnston 1971).

A third development of the mobility theory to be noted here is the disaggregation of the heterogeneous migratory cohort (Spilerman 1972).

4. A GENERAL MODEL OF THE REGIONAL LABOUR MARKET

The above discussed concepts of the mechanism for migration make it possible to sketch a general model of the regional labour market. This sketch may be begun with dealing with two entities: the labour pool and the job pool (Figure 1). When a new job is

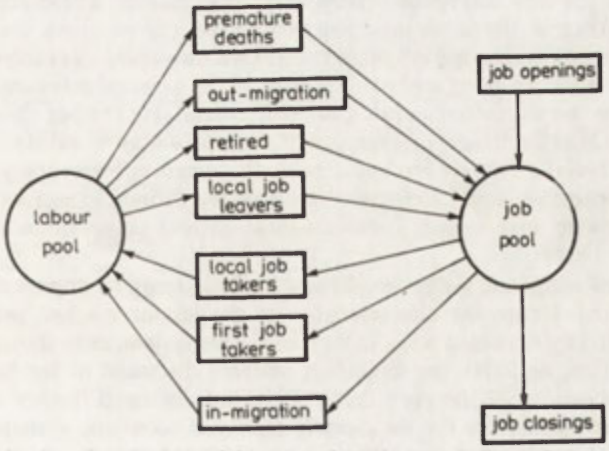

Fig. 1. The mechanism for the local labour market (Arrows indicate flows)

created, it contributes to the job pool. The new job may be filled or remain vacant. If the former, it may be filled in three ways: by a first job taker, by a local job taker, i.e. an individual who had once a job, or by an in-migrant (McKinnon 1975). In each case, there is an output from the vacant job pool and an input to the labour pool in the region. If the system is to be self-regulated, it also needs relationships of the opposite direction. These are represented by local job leavers, retired, premature deaths and out-migrants. Each of the groups creates an output from the labour pool and an input to the vacant job pool. As can be easily seen, migration is just one equilibrating mechanism in the system in question (Öberg and Oscarson 1979).

The equilibrating mechanism has seven inputs / outputs and is "almost symmetrical", premature deaths being the only unmatched element. The local job leavers/takers term needs, however, a comment here. In the neo-classical economic theory this would certainly be substituted by unemployment terms. Here, the latter were disaggregated into two components to make the model more general, i.e. valid whether or not unemployment applies to the considered economic system. If it does not, the local job leavers/takers are persons who change their job locally, being leavers and takers at the same time.

If the system in question is to be controlable, it, as a whole, needs to have an input and an output. Job openings are the input of the system, job closings being the output. As an open system, it can also be controlled indirectly, i.e. through the elements of the equilibrating mechanism: migration, local job turnover, first job takings, retirements or premature deaths. To steer each of the elements is technically possible, although it may be socially undesirable or even unacceptable, e.g. in case of premature deaths.

The presented general model of the regional labour market underlies the explanatory scheme of the mechanism for migration in Poland, to be presented further on. It would seem, however, useful to provide the general characteristics of the Polish labour market first.

5. GENERAL CHARACTERISTICS OF THE POLISH LABOUR MARKET

The economic reform which formally started in 1981 in socialised agriculture, and in 1982 in the remaining part of the socialised sector, is certainly too recent to have been able to change the general mechanism for the labour market which had worked for over three decades. The reform is a process rather than an event. Since the new economic system formally started, none of its fundamentals has yet been implemented. Four fundamentals of the new economic system may be identified. These are: (1) independence of enterprises in the intra- and inter-enterprise organization, the provision of materials, sale, prices, wages and employment; (2) self-governing of enterprises; strategic role of the state in the planning and management of the national economy in general by parameters (taxes, tariffs, exchange rates, rates of interest, etc.) rather than orders given to enterprises; (3) self-reliance of enterprises with profit as a substantial economic category; credit based on purely economic rules; the sanation/bankruptcy procedure for insolvent enterprises; (4) equal chances to each of the economic sectors: state-owned, co-operative, private, and joined; demonopolisation and competition as the way to equilibrate the market.

While the new economic system works to a limited extent, its impact on migration is even more limited. Hence the characteristics of the labour market, provided herein, applies to the directly managed economic system. This system, even though formally no longer in operation, underlay the migration patterns discussed at the begining of this paper. The implications of the economic reform are discussed further on. Here, it is assumed that the mechanism for the directly managed economic system basically still works on the labour market, even though to a limited extent.

The market has been determined by the prevalance of the socialised sector outside agriculture, i.e. almost entirely state-owned in industry, with a somewhat larger share of the co-operative sector in trade and services, and of the private sector in small business. The latter has worked under considerable uncertaintly, involved by frequent changes in the respective policy. In agriculture, 2/3 of the land is privately owned, 1/5 state-owned, and the small residual owned by co-operatives. Private farms are generally undersized, and this explains their limited machanisation. Traditionally, farming has been treated as a reserve of non-farm labour (Landau 1981). This attitude has changed as a result of the economic crisis in industry and the food shortage, the more so in that the private sector has been the main producer of food on the national scale.

The planning and management system, adopted in the early 1950s, was rather inflexible. Being highly centralised, it preferred large industrial enterprises which could be more easily directly controlled. However, the large industrial lobby has not been balanced by either the consumer movement or the local self-government, and this fact was responsible for the development of industry, especially heavy industry, as the core of the national economy and the labour market. Industrial enterprises rather than local councils have been in force to promote their locations of production, the development of the tertiary sector, to control the housing market and to ignore the environmental costs of the industrial development. Therefore, industry rather than the tertiary sector has been the urban-creating function.

The massive unemployment as a structural feature was liquidated during the Six Year Plan between 1950 and 1955. It was only in certain areas, especially unindustrialised small towns, that a labour surplus could be occasionally found. The surplus tended to be neutralised in hardly any way but by the development of industry. Latent reserves of labour have been made in industry to be used in certain seasons only because the process of production has not, due to the overcentralisation, been regular from season to season (Landau 1981). The liquidation of evident unemployment was, therefore, accompanied by hidden unemployment, i.e. overemployment, as long ago as during the Three Year Plan between 1947 and 1949 (Bobrowski 1981). This was a structural feature, interrelated with the directly managed economic system. This overemployment has produced the demoralisation of employees and has contributed to low efficacy (Bobrowski 1981; Landau 1981).

The growing employment in industry was responsible for the enormous growth of bureaucracy and the drainage of labour from agriculture. As a result, aging and the feminisation of the farm labour force was evident. A considerable group of double job holders also developed who owned small farms and worked in industry (Landau 1981). Within this group, potential rural to urban migrants, who were unable to move because of the housing shortage, could be found. The deficit on the housing market was caused, again, by the centralisation of the management system.

The co-operative ownership in housing had developed rather rapidly from the 1960s onwards, yet in the mid-1970s it received an undesired monopoly in larger towns by stopping the development of the local councils' housing pool. Membership of the co-operatives appeared to be *de facto* compulsory for those who needed dwellings, and the co-operatives themselves were extremely centralised and submitted to the control of both the public and the industrial administration. It was in this way that the large industrial lobby promoted its own staff on the housing market (Rykiel 1982b and 1986). In small towns and rural areas, private housing has been the only possible way to follow; this is, however, difficult since the whole economic system has been industry-oriented rather than market-oriented. Generally therefore, housing supply, as combined with the accessibility to services, has been felt to be far better in large cities and urban agglomerations than in small towns and rural areas, and this fact has produced an additional pressure on the metropolitan housing market. As a result, restrictions on migration to a few of the largest cities were introduced in the 1950s and abolished only

in the 1980s. The restrictions produced a segregation of potential migrants; a few groups were produced, each having a differential difficulty in achieving dwellings in the large city (Jałowiecki 1982).

On the other hand, industrial regions and urban agglomerations have been handicapped by the deterioration of the environment, and this fact has worsened the quality of life in those areas. They were perceived by some migrants as good places for improving or learning skills and earning money rather than for permanent domicile (Słodczyk 1981).

The Polish post-war labour market has been highly closed for foreign migration. In the relationships with other national labour markets out-migration has decidedly dominated. Within the latter, seasonal and periodical out-migration prevailed in the 1970s. Most of the permanent departures was accomplished either as tourist excursions or within the framework of the Polish – West German re-uniting of families agreement. The latter, contrary to its official label, applied, in fact, to hardly any other but to economic emigration (Rykiel 1982b, 1985b, 1986b).

6. A MULTICAUSAL MODEL OF MIGRATION IN POLAND

Now, let us apply the general model of the regional labour market to Polish conditions and set it in a multiregional context. Let us start from investments and assume they are dependent on exogeneous factors of the model (Figure 2). The investments may be divided into those in agriculture, industry and mining, transport infrastructure, housing, and services. It seems useful to disaggregate the investment projects in industry and mining into intensive and extensive. The latter are related to the

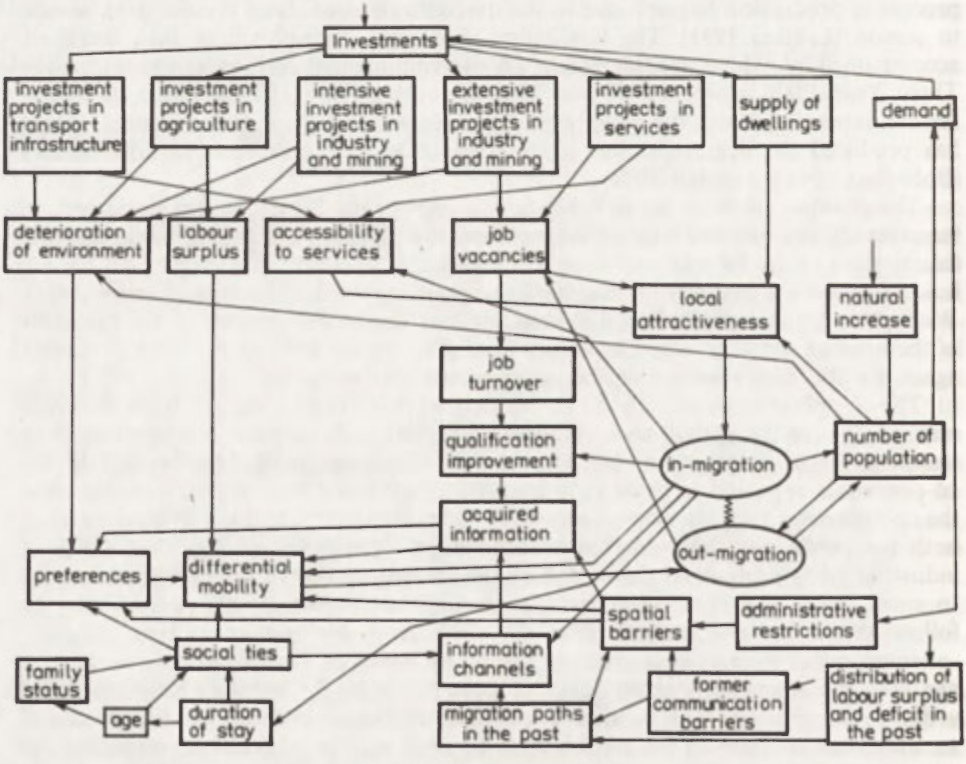

Fig. 2. A multi-causal model of migration in Poland (arrows indicate causal links)

expansion of the industrial sector and provide new jobs; the former, on the contrary, are generally related to mechanisation or more efficient management and to produce a labour surplus. It is also assumed that investment projects in agriculture are intensive and produce labour surplus while those in the tertiary sector are extensive and provide new jobs. The investment projects in the services and transport infrastructure improve accessibility to services. The latter may be, however, also improved by making a decision on migration; in-migration, therefore, contributes to a higher accessibility to services. Investment projects in industry and mining, agriculture, and transport infrastructure involve, in turn, the deterioration of the environment, which is also influenced by demographic growth.

Many job vacancies, together with housing supply and accessibility to services, account for the increase in local attractiveness on which migrants react directly; thus, local attractiveness induces migration. For the increase in local attractiveness, demographic growth is also responsible since it contributes to the metropolitan atmosphere and makes it easier to hide in the crowd. On the other hand, many job vacancies involve rapid voluntary job turnover. Both job turnover and in-migration, or, generally, occupational and spatial mobility, involve the improvement of skills and, with the support of the employer, even formal education. Both of them are useful in the acquiring of information on the more extensive labour market. In the gaining of information, channels of information and spatial barriers also play their parts. Acquired information, joined by social ties, spatial barriers and the deterioration of the environment, influences preferences. The latter, together with other factors, influences differential mobility which, in turn, produces out-migration and thus contributes to the creation of job vacancies.

The three-fold role of spatial barriers should be explained here in more detail. Firstly, a spatial barrier influences information by not allowing it to get through. Secondly, it affects preferences in the sense that an individual, even if informed about an attractive job vacancy is not inclined to accept it because of its location on the other side of the barrier, i.e. in the disliked area. Thirdly, it can also influence differential mobility in the sense that an individual who wishes to move across the barrier, is not allowed to.

Both preferences and differential mobility are influenced by social, i.e. kinship, friendship, and economic, ties. The ties are dependent an age, family status and the duration of stay. The three are also interrelated. Duration of stay, influenced itself by in-migration, involves age, for the longer an individual has lived in a place, the older he is. Age, in turn, influences, in a probabilistic way, the family status. Differential mobility is, therefore, dependent on labour surplus, in-migration, acquired information, preferences, social ties and spatial barriers.

Social ties, together with in-migration and migration paths in past periods, influence channels of information. The migration paths in past periods were involved by the then existing distribution of labour surplus and deficit of labour as well as the then existing communication barriers. Factors influencing the latter three may be recognized as exogeneous for the model. The migration paths and the communication barriers in past periods, as well as current administrative restrictions, are responsible for contemporary barriers.

In- and out-migration are interrelated by the dialectical link of being the opposite sides of the same coin; one who out-migrates from A, in-migrates to B. Both in- and out-migration, joined by the natural increase, influence the regional population pool. Natural increase is assumed to result from exogeneous factors, even though, in fact, some of them are endogeneous for the model. The population pool is linked by a feedback relation with out-migration. Besides, the population pool influences local attractiveness, demand and the deterioration of the environment. Demand, in turn, is one factor which involves investments and administrative restrictions.

7. FURTHER DEVELOPMENTS

The multicausal model of migration in Poland, discussed above, refers explicitly to economic models of migration, for the main concept the model is based on is that of the mechanism for the labour market. The model, however, also refers to the sociological interpretation of migration by, especially, the implication of the identity of, or the correspondence between, the notion of the regional (local) labour market and that of the regional (local) community. Additionally, a few demographic concepts may be included in this model. After a simplification and a generalisation, a model of the mechanism for migration in Poland is obtained (Figure 3).

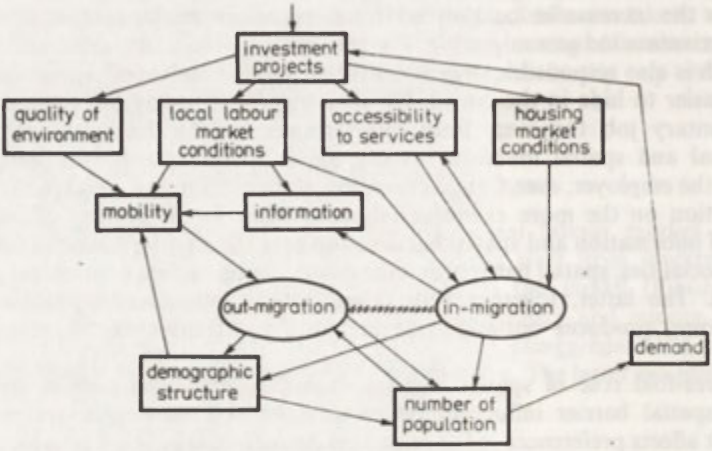

Fig. 3. The mechanism for migration in Poland (arrows indicate causal links)

The description of the mechanism may be begun with investment. Investment projects are responsible for the situation on the local labour market, that in housing, accessibility to services and the quality of the environment. The situation on the local labour market underlies mobility, information and in-migration. The latter also influences information which, in turn, together with the quality of the environment, contributes to mobility. Mobility involves out-migration which is interrelated to the population pool. Out- and in- migration influence the demographic structure which, in turn, underlies mobility and the population pool. The latter is also influenced by in-migration, involved itself by the housing situation and interrelated to accessibility to services. The population pool involves demand which, in turn, influences investment.

The multicausal model of migration in Poland in Figure 2, even though it deals explicitly with the fundamentals of the directly managed economic system, seems to provide a fairly adequate description of the current mechanism for migration in Poland. Further developments in the mechanism should be referred to the changes in the system of the management of the national economy.

Two main directions of the changes will be set up by the extent of the practical implementation of the new economic system and the Territorial Self-Government Act of 1983. The essential problem to be resolved by the new economic system is the liquidation of overemployment as a structural feature. Since the formal start of the new economic system, the latent reserves of labour have not noticeably decreased. On the national scale, 300 000 job vacancies are reported while overemployment is estimated as between 2 000 000 and 4 000 000 (Bodnar 1986).

The essential problem to be resolved by the territorial self-government is, in turn, the practical application of the fiscal mechanism for the control of the behaviour of individuals and enterprises. An active policy of local taxes and their reductions might be an instrument of the industrial location policy, including protection of the environment. Similar instruments applied to housing might be essential for controlling migration.

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SPATIAL BARRIERS: CONCEPTS, USE AND AN APPLICATION TO INTRA-REGIONAL MIGRATION

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INTRODUCTION

To begin with its semantic, barrier can be defined as what prevents, hinders or controls progress or movement. The identification of barriers in socio-spatial sciences is relative rather than absolute. It could be argued that barriers are revealed within a specified conceptual framework of the behaviour of socio-economic territorial systems in a given time and place. Therefore, barriers have to be related to the process they concern (Łoboda 1983).

Distance decay functions, which are generally accepted in socio-spatial sciences, are based on the assumption that the interactions between the elements of socio-economic territorial systems to be examined are inversely proportional to the distance between the elements. The assumption, referred to as friction of distance, is related to the increase in the costs of communication when the distance increases. The revelation of spatial barriers involves the deviation of the actual patterns of interrelationships from regular, optimal or most probable patterns (Domański 1970).

In human geography, spatial barriers were most frequently discussed in the spatial innovation diffusion context. For some students spatial barriers were basically linear forms (Hägerstrand 1957; Morrill 1965) while others argued they were areal forms which should be considered as a function of the given process (Yuill 1965). From this perspective, spatial barriers were classified as exogeneous for the process in question, whereas natural and political barriers were included into the former class (Yuill 1965).

While considering their shapes, barriers were identified as parallel, transversal or transversal with a gap. The shape of the barrier was considered as the main factor of the spatial deformation of the diffusion (Yuill 1965). Others, however, indicated that interdependence between the shape of the barrier and the diffusion in question is equivocal (Brown and Moore 1969).

When considering their functions, barriers were classified as: (1) absorbing, i.e. ones which make diffusion in the given direction impossible; (2) diverting, i.e. ones which involve the change in the direction of diffusion; (3) filtering, i.e. ones which involve the delay or deformation of or selection in diffusion; (4) multifunctional, i.e. ones which cumulate the former (Yuill 1970). Referring to this classification, Domański (1970) identified four types of barriers: (1) superabsorbing, i.e. one which absorbs diffusion and destroys its origin; (2) absorbing, i.e. one which absorbs diffusion, not to affect its origin; (3) diverting, i.e. one which enables a new diffusion from the origin in the same generation; (4) fending-off, i.e. one which directs diffusion to another destination.

In the discussion of the questions of the barriers of growth in spatial economy, Maik and Parysek (1978) identified five types of barriers, i.e. (1) natural, (2) demographical, (3) economic, (4) social, and (5) organizational/institutional. This, however, was not a

logical division, for the first of the identified types of barriers was a much more general category than the other four; rather, it should be contrasted to the four which together would be categorized as cultural or human barriers.

Łoboda (1983) indicated that much attention in the literature was paid to the aspects and forms of spatial barriers in contrast to the mechanisms of the emergence, development and erosion of the barriers while it is the mechanisms that are responsible for the contemporary structure and forms of the barriers. While searching for the mechanisms and processes, one would consider the concept of the thresholds in the development of spatial processes, as provided by Malisz (1963), and Malisz and Żurkowski (1971). Another approach was one which departed from the tight concept of innovation diffusion, which applied to the division of the elements of the analysed system into active (origins) and passive (destinations of diffusion), for the concept of interrelationships or interactions, which are both the cause and a result of the integration of the elements of the system. This way of thinking was pioneered by Mackay (1958) in his analysis of the Ontario–Quebec boundary effect. Domański (1970) investigated the role of provincial boundaries as spatial barriers in a developing industrial district. Rykiel (1985) studied the inertia of the ninteenth-century international European borders which have been affecting the regional spatial behaviours by producing bondary effects. The administrative control of migration to the East European metropolis, which was found to set an effective barrier to out-migration (Houston 1979), was also analysed in terms of spatial barriers, with their boundary effects examined (Rykiel 1984).

In the history of geographical thought, the notion of a spatial barrier has been closely related to that of the boundary. Traditionally, these were divided into two basic groups, i.e. natural vs artificial boundaries and spatial barriers. This dichotomy, generally accepted by the traditional regional geography, was, however, questioned (Hartshorne 1933), Indeed, the contiguity of the earth surface implies the artificiality or conventionality of any "natural" boundary, at least linear boundary. Instead, taking the functional point of view, spatial barriers should be discriminated in terms of their formalization. Therefore, the basic division of spatial barriers would be that between formal and informal barriers. The formal barriers can be identified with political boundaries. International and intra-national political boundaries are to be included into this group. These can be classifield in accord with the degree of their formalization. In doing this, hard and soft boundaries can be identified at the extremes, and intermediate between them. The hard boundries are accompanied by the boundary control.

Any political boundary is nowadays a barrier for the territorially fixed relations. From the point of view of these relations, asking the question of whether or not a boundary is a spatial barrier, is an obvious tautology. On the contrary, the question is not tautological for the territorially flexible relations. In turn, the informal spatial barriers (to which both physiographical and cultural barriers should be included) used to be soft whenever they could be found in their pure form, i.e. if they are not followed by formal barriers.

From the genetical point of view, antecedent and subsequent barriers could be identified (Hartshorne 1933). The former are original to the existing forms of spatial organization; socio-economic development, that is related to the integration process, involves therefore the "erosion" of the barriers, i.e. the diminishing of their role as spatial barriers. The subsequent barriers are later than the existing forms of spatial organization; they involve the disrupting of the developed patterns of interrelationships; the durability of these barriers contributes to the increase in their role as barriers.

THE MODEL OF SPATIAL BARRIERS

The method of the quantification of boundary effect, outlined by Mackay (1958) and developed by Domański (1970), is based on the estimation of the parameters of the

regressive distance decay function model for interactions between the elements of the socio-economic territorial system which are assumed not to be separated by spatial barriers. Then, the equations with the estimated parameters are to be used for interactions between the elements of the system which are assumed to be separated by the barrier(s). In this way, theoretical interactions across the barrier are to be estimated, i.e. ones which would exist if the involved elements of the system were not separated by any barrier. The actual to theoretical interactions ratio provides the boundary effect. Conceptually, the procedure implies a disaggregation of the set of the elements of the analysed system into homogeneous zones which are separated from each other by spatial barriers.

The provided outline of the model is rather general; in order to give it an operational form, it is necessary to specify the function to be used. Although any distance decay function can be used in the model, gravity models were used in most of empirical investigations (Mackay 1958; Domański 1970; Rykiel 1985):

$$I_{ij} = k\frac{P_i^{w_i} P_j^{w_j}}{d_{ij}^{b}}, \tag{1}$$

where:

I_{ij} – interaction between i and j,
P_i, P_j – size (population) of i, j,
d_{ij} – distance between i and j,
k, b, w_i, w_j – parameters.

In the operational form, the model is estimated for individual elements i of the system. Thus for any i

$$\hat{I}_{ij} = k_i\frac{P_j^{w_{ij}}}{d_{ij}^{b_i}}, \tag{2}$$

where:

$\hat{I}_{ij}$ – the estimated interaction between the given element i and any element j,
P_j – size (population) of j,
d_{ij} – distance between i and j,
b_i – the "friction of distance" for interactions with i,
w_{ij} – the weight of the population of j for interactions with i,
k_i – the "gravity constant" for interactions with i.

The model is estimated in the logaritmic form:

$$\ln \hat{I}_{ij} = \ln k_i + w_{ij} \ln P_j - b_i \ln d_{ij}, \tag{3}$$

where:

k_i, w_{ij}, b_i – parameters of the equation.

The questions of the model were discussed in detail by Rykiel (1981). It is worth noting here that, since the model is estimated in the logarithmic form, it is essential to avoid the necessity of logarithming zeros; this can be done by accepting the convention that if $I_{ij} = 0$, it is assumed that $I_{ij} = 0.1$.

The recognition of the actual to theoretical interactions ratio as a measure of the boundary effect implies that the estimation of the theoretical interactions provides perfect goodness of fit, i.e. no error of the estimation of theoretical interactions exists. If it really were the case, the intra-zonal estimated interactions would be equal to the respective actual interactions. Since the estimated and actual intra-zonal interactions differ, an estimator was proposed (Rykiel 1981):

$$e = \frac{\hat{I}_{ij}}{I_{ij}}, \tag{4}$$

which indicates what fraction of the actual variance is accounted for by the model. The modelled interactions are overestimated if $e > 1$ and underestimated if $e < 1$. To improve the estimated barrier effect, one is to divide the estimated theoretical interaction by the estimator before the actual to theoretical interactions ratio is calculated.

INTERPRETATIONS

In his original study, Mackay (1958) interpreted the boundary effect in terms of the increase in social distances as compared with the respective physical distances. He endeavoured to find how many times the given sets of towns (or zones) were more distant from one another socially than physically. Domański (1970) interpreted the boundary effect in terms of the reductory role of the barrier for interactions. He examined how many times the given spatial barriers reduced the theoretical inter-zonal interactions. Rykiel (1981) interpreted the boundary effect in terms of the percentage of the theoretical interactions which were accouned for by actual interactions. On the base of empirical investigations, a classification of the permeability of spatial barriers was provided (Rykiel 1985; see Table 1).

TABLE 1. A classification of the boundary effect

The theoretical to actual interactions rate	Percentage of the theoretical interactions accounted for by actual interactions	The impact of the barrier
< 1	> 100	no
$1 - 2$	$50 - 100$	weak
$2 - 4$	$25 - 50$	moderate
$4 - 10$	$10 - 25$	rather strong
$10 - 100$	$1 - 10$	strong
> 100	< 1	very strong

Boundary effects in socio-economic territorial systems may be compared in three basic ways. Firstly, the most important (most strict) barriers may be identified for a given interaction. Secondly, the interactions may be identified which are the most strongly affected by a given barrier. Thirdly, individual systems may be identifield in which barriers of individual degrees of permeability are to be found. Obviously, individual spatial barriers produce different boundary effects for different interactions. Also, the boundary effect in the case of a given spatial barrier need not be symmetrical which is to say that the same kind of interaction when directed across the same barrier may produce quantitatively different boundary effects (Rykiel 1984).

Basically, the spatial barrier is a hindrance for interactions between the elements of the settlement system in a gravity type field. Therefore, a large city which hinders interactions between small towns located on its opposite sides is not a spatial barrier but rather an immanent element of the field. Although numerical results may be obtained for the impact of the city on the stifled interactions between individual sectors of its hinterland by the use of the model of spatial barriers, they cannot be interpreted in terms of boundary effects.

LIMITATIONS

While using the model of spatial barries, it is assumed that the location of the barriers was *a priori* known, since what was examined were well grounded boundaries.

This, however, applies merely to formal boundaries. Informal barriers, on the contrary, may have rough rather than exact locations for the student. For instance, the low migrations in the Warsaw agglomeration between towns located on each side of the Vistula river down of the city imply a spatial barrier, yet they do not ascertain whether the barrier follows the river, the national park on its left bank, the county-level boundary which crosses the park or if it is an areal barrier that comulates the alternatives (Rykiel 1984).

The model of spatial barriers implies a disaggregation of the socio-economic territorial system under investigation into homogeneous zones. The homogeneity of the zones is a crucial, although unrealistic assumption which involves a number of limitations of the model. Firstly, the homogeneity assumption ignores the fact that in reality, at least in the case of territorially fixed relations, a hierarchy of barriers can be found in the analysed system (Fig. 1). When the boundary effect was examined for commuting to schools, it was *a priori* assumed that it was the provincial boundaries that might have produced boundary effects while the county-level boundaries were ignored within individual zones (Domański 1970), even though they legally stifled the interaction.

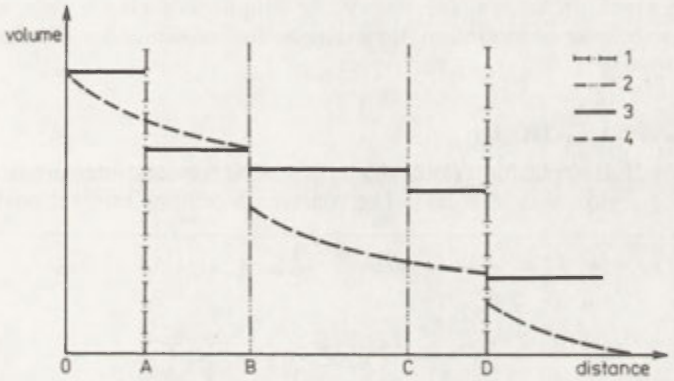

Fig. 1. Territorially fixed and territorially flexible relations vs spatial barriers (After Grimm 1979, Fig. 2, modified). Note that only B and D are spatial barriers for the territorially flexible relation: 1 – provincial boundaries, 2 – county boundaries, 3 – territorially fixed relations, 4 – territorially flexible relations

Secondly, the homogeneity assumption implies that the traditional regionalisation of the analysed area, the regionalisation being well grounded in students' consciousness, is still valid. This implies internal integration within the identified zones. It may, however, happen that one or more zones have disintegrated, so that some of their urban places gravitate to a centre within another zone rather than in its own. This development was partly evidenced in southern Poland where the distance decay pattern of spatial behaviours and social relationships seemed, in a few cases at least, to prevail over the nineteenth-century spatial barriers (Rykiel 1985).

Thirdly, the homogeneity assumption is inconsistent with the structure of the gravity type field the model is based on. This is especially evident while analysing administratively controlled migration to large cities. The very administrative control of migration itself makes the municipal boundary a spatial barrier which separates the core from its periphery. Therefore, two zones may be identified in a metropolitan area, i.e. municipal and suburban. Despite the administrative control, the general pattern of migration is basically centripetal which implies weak interactions within the suburban zone. In the modelling, it is, however, these interactions that the model is based on. Therefore, the theoretical interactions estimated in this way are much weaker than the actual

interactions. In result, the model suggests a negative boundary effect, i.e. a strong gravity centre rather than a hindrance for migration.

Another limitation of the model of spatial barriers does not apply to the homogeneity assumption. It is referred here again to the case of administrative control of migration to the city. In this case, the municipal boundary is a spatial barrier which separates areas of which different spatial patterns of interactions are characteristic. More specifically, interactions in urban areas frequently do not follow the distance decay rule; not only may they be distance-free but, because of the limited spatial scale, they may even be positively dependent on distance (Mazurkiewicz 1977). Therefore, the estimation of the theoretical interactions between the central city and its suburban zone may be based on equations with positive exponents of distance and negative of population. Thus, the theoretical interactions, estimated in accord with the intra-urban spatial pattern, would be many times higher than the actual which, in result, may unrealistically suggest the perfect unpermeability of the municipal boundary for out-migrants.

Like other gravity type models, the model of spatial barriers, in its logarithmic form, is based on the size of the destination, the size of the origin being constant for a given urban place. This implies that merely pull forces are taken into account while push forces are ignored. In reality, the size of the origin does play a role, at least as a limitation; in the case of migration, for example, the total number of migrants cannot exceed the total population at the origin.

EMPIRICAL APPLICATION

As an empirical application of the model of spatial barriers, inter-urban migration in the Katowice region was analysed. The nineteenth-century international boundaries

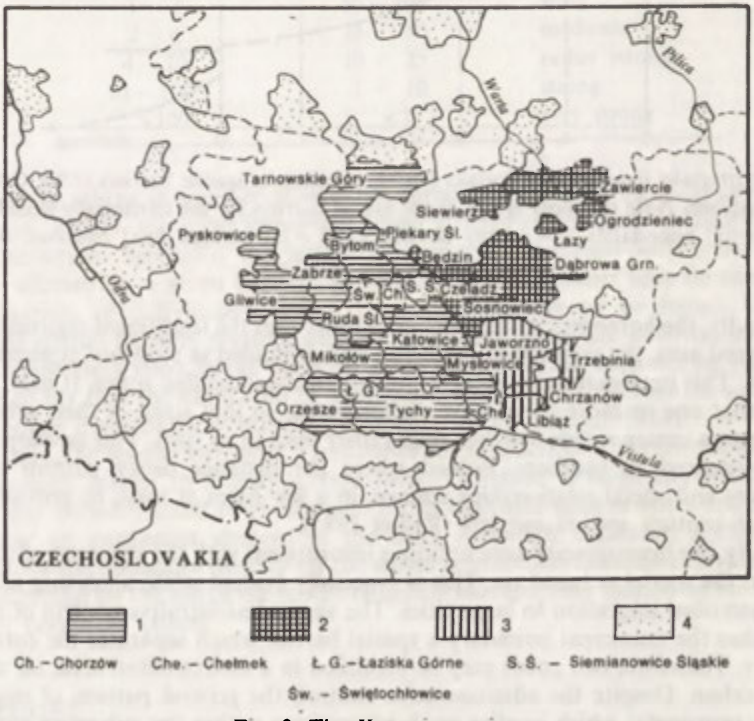

Fig. 2. The Katowice region
The analysed towns of:1 – Upper Silesia, 2 – the Dąbrowa Basic, 3 – the West Cracovian District, 4 – towns not analysed

were taken as spatial barriers. In this way, three zones were identified, viz. Upper Silesia in the west, the Dąbrowa Basin in the north-east, and the West Cracovian District in the south-east, in which sixteen, eight, and five urban places, respectively, were analysed (Fig. 2). The impact of the spatial barriers between the three zones was modelled as based on the 1978 inter-urban migration. Eleven groups of migrants were analysed, i.e. total, both sexes, four age groups, and four categories of education (Table 2).

TABLE 2. The boundary effect for migration in the Katowice region, 1978. The *de facto* to theoretical migration rate (per cent)

Groups of migrants	Zones					
	US→DB	US→WCD	DB→US	DB→WCD	WCD→US	WCD→DB
Total	4.5	0.7	12.8	13.9	1.3	0.9
Males	4.8	0.8	14.8	18.7	0.9	0.6
Females	4.7	4.7	14.7	14.9	28.2	23.9
Aged 0 – 15	6.2	0.9	15.3	15.6	3.0	3.6
16 – 29	4.3	0.9	16.5	16.1	0.6	0.2
30 – 59	4.9	0.6	21.1	26.5	7.5	10.8
60 or over	3.9	1.4	17.7	35.6	0.1	0.0
Education						
primary	4.3	0.9	15.0	13.9	1.7	1.3
post-primary skilled	5.7	1.2	13.7	15.6	0.2	0.0
secondary	4.6	0.8	21.4	20.2	5.1	4.7
tertiary	3.8	0.8	59.7	23.7	30.0	25.1

US – Upper Silesia, DB – the Dąbrowa Basin, WCD – the West Cracovian District.

In general terms, the impact of the spatial barriers in the Katowice region turned out to be more explicit than in the case of the Konin/Łęczyca/Inowrocław region (Domański 1970), albeit what was analysed in the latter case was not migration. In the Katowice region, it is the Upper Silesian/Dąbrovian and the Dąbrovian/West Cracovian barriers that are the least explicit for migrants. This implies the largest openness of the Dąbrowa Basin, even though in absolute terms the impact of these barriers should be categorized as strong. Each of the three barriers is asymmetrical in its impact on migration; the most asymmetrical boundary effect is produced by the Dąbrovian/West Cracovian barrier, the asymmetry is 15-fold for the total, 31-fold for males, 80-fold for the young, and infinitely large for the old.

In the case of female migration, it is the Upper Silesian/Dąbrovian and the Upper Silesian/West Cracovian barriers that produce an especially large boundary effect. It implies a considerable closeness of Upper Silesia for female migration. It is also the Upper Silesian zone that is the most strongly closed for tertiary educated migrants while it is the West Cracovian zone which is the most strongly closed for post-primary educated skilled migrants.

Generally, the least impact of spatial barriers is reported in cases of all the groups of migrants from the Dąbrovian zone, from which the out-migration is reduced ten times, which is, however, a considerable figure. On the contrary, the migration of the tertiary educated from the Dąbrovian to Upper Silesian zones are reduced less than twice. In cases of the migration of females and the tertiary educated, a considerable openness is characteristic of the West Cracovian zone from which out-migration is reduced three to

five times. On the contrary, it is the Upper Silesian zone that is the most strongly closed; it is here that no more than 1/16 of theoretical migration is succeeded in the case of no single group of migrants, while in extreme cases the figure drops to 1/140.

A more detailed analysis indicated (Rykiel 1985) the dominant position of the Upper Silesian zone. This is manifested by a greater impact of the spatial barriers on the groups of migrants with more advantageous social positions (i.e. the tertiary and secondary educated as well as the matured and the older) than on the socially handicapped (i.e. the post-primary educated skills as well as children and females). The Upper Silesian zone is being left by the socially weaker rather than the socially stronger who tend to stay. Of the other two zones, the opposite pattern is characteristic: the most strongly limited by the spatial barriers are migrants with a disadvantageous social position (i.e. the primary and the post-primary educated, as well as females, children and the young) while those of a more advantageous social position (i.e. the tertiary educated as well as the older and the matured) are the least limited. This spatial pattern reveals a clear social connotation of spatial barriers. Spatial barriers filter migrants in such a way that the boundary effect is stronger for the migrants of more disadvantageous social position when trying to leave the areas of more disadvantageous location; in the case of migration in the opposite way, on the contrary, the boundary effect is more explicit for the migrants with a more advantageous social position. The spatial mobility of the socially stronger is, therefore, constrained by the distribution of the location advantages which they do not wish to give up while the spatial mobility of the socially weaker is constrained by the distribution of the location disadvantages from which they cannot be released.

The analysis of the boundary effect for individual groups of migrants in the Katowice region indicated, similarly to the Warsaw agglomeration, a positive correlation between age and the social position, which implies the inteligentsia's (or the middle class') type of socio-economic structure. In the Łódź agglomeration, on the contrary, a "natural" negative correlation was indicated, which is characteristic of the working class' type of socio-economic structure.

CONCLUSIONS

What was discussed in the section before the former was the limitations of the very model of spatial barriers. Obviously, limitations characteristic of the entire group of regressive models, mathematical modelling, and related problems, which have been extensively discussed in the literature, also apply. As an alternative, a model referring to the entropy maximisation concept could be used (Wilson 1970, 1974). Then

$$I_{ij} = a_i O_i b_j D_j \exp(-\beta_1 d_{ij} - \delta_{ij} \beta_2 d_{ij}), \tag{5}$$

where:

I_{ij} – interaction between i and j,
O_i – size of the interaction's origin,
D_j – size of the interaction's destination,
d_{ij} – distance between i and j,
$\delta_{ij} = 1$ if i and j are separated by a barrier
$= 0$ otherwise,
a_i, b_j β_1, β_2 – parameters.

To conclude this paper, it seems worth noting that the model of spatial barriers is based on the concepts of the theoretical and estimated interactions. As far as spatial behaviours are concerned, the concept of potential interactions would, however, be more fruitful. This would have to consider social aspects of interactions, which would involve another methodology.

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APPLICATION OF TWO TYPES OF MIGRATION DATA TO MULTIREGIONAL DEMOGRAPHIC PROJECTIONS

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1. INTRODUCTION

The last two decades have brought an intensive development of various demographic models and thereby an increased interest in the data concerning all the demographic phenomena. Simultaneously, one could observe a tendency towards comparative studies on the results obtained in different countries, with different models and on the basis of diverse data. It is on these grounds that there grew a broad research program, carried out within the International Institute for Applied System Analysis (IIASA) under the leadership of A. Rogers and in collaboration with several dozens of scientists from almost twenty countries. The key to the successful implementation of the program was the adoption of the unified methodology, described in Rogers (1975), i.e. the so-called Rogers model, as well as the application of the widely available program packages (Willekens and Rogers 1978). In spite of unified methodology "... comparability is, however, severly handicapped by the considerable degree of incomparability of the input data, in particular the migration data." (Rees and Willekens 1981, p.73). This incomparability resulted from different ways of data collection (registration data versus census data) and from differences in the periods for which data were collected.

The work presented is an effort at performing a comparative analysis of the results obtained by the Rogers model when two types of migratory data are fed into this model. The analysis was conducted for the three following aspects: (1) mobility patterns of population represented by raw data were compared, (2) results of the Rogers model for two data types were compared, (3) the usefulness of the data on these two types for forecasting purposes was assessed. The hypothesis was adopted, according to which the two data types, used to generate – in the projections – spatial distribution and population structure settings, display specific features.

It should be emphasized that the main goal of the work presented is the study of the influence exerted by methods of measuring migration, and not of the migratory behaviour patterns. In view of the methodological nature of this work it was decided to limit the number of regions considered, so as to simplify the making of comparisons. Basing on such assumptions the study concentrated on two regions: urban and rural. Projections were produced separately for women and for the whole of the population, with disaggregation into 18 five – year age groups.

2. POPULATION MOBILITY PATTERNS IN THE LIGHT OF TWO METHODS OF MEASUREMENT

The key problem in undertaking any sort of study in migrations is the availability of a proper data basis. The manner in which migration is measured is reflected in the research results, since depending upon what is understood by the notions of migrant and migration various numbers and characteristics of moving population, can be obtained.

The statistical material subject here to analysis comes from two sources: from current registration and from the results of the National Census of 1978. During computerized data processing the interregional flow matrices regarding events which occurred in 1978 were prepared. Characteristics of the two sources of data on population mobility are given below.

In current registration such changes in place of residence are considered as migration, owing to which the persons in question either moved into a given locality for permanent residence, or changed the nature of residence from temporary to permanent, while the place itself remained the same. Migrations of the second group of persons are of a formal nature: in fact, a given person migrated when moving into the locality of present residence. Note that registering would not account for the migrations of those who relocated and are resident for many years in workers' hostels or campuses, since in the place of their new residence they are not registered for permanent domicile.

During the 1978 National Census, the inquiry into population mobility was performed via the representation method with the 10% sample. Respondents were asked to give the year and place of birth, and specify since when they have been staying in a given locality and where they had lived before. A person who lived in the same locality from birth would be considered immobile, while any person living in a locality differing from his/her birth-place, or who had lived for some time outside the birth-place locality – would be considered a migrant.

It is specific for Polish statistics that it creates an artificial category of people registered as temporarily domiciled in a given locality for more than two months. This concerns primarily all those who change their residence for some time due to education,

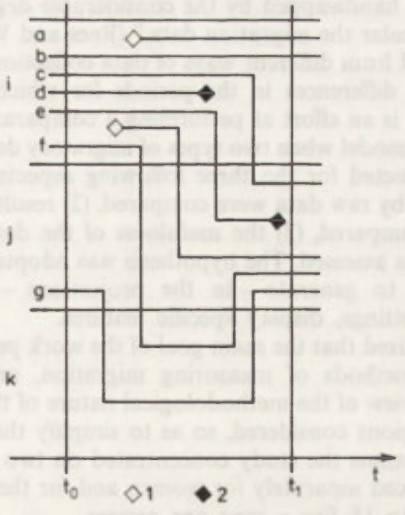

Fig. 1. Spatial and temporal "life paths": 1 – birth, 2 – death, i, j, k – regions, a–g – persons, t – time

job start, lengthy medical treatment or other causes. The two information sources on migratory movement, available in Poland for 1978 can not be directly compared, since they account for different categories of migrating population: data from current registration do not take into account the temporary migration, while the Census data do also account for migrants who have temporarily changed their residence location.

Let us finally note, after Courgeau (1973) and Rees (1977), that there are basic differences between studying the numbers of migrants (transition approach) and the number of migrations (movement approach). Figure 1 schematically presents the possibilities of migration events. Persons *a*, *b* and *d* would not leave their region of residence, with *a* born and *d* deceased within the period analysed. Person *e* migrated, bud died before the end of the period, so that this person will be accounted for in the current registration method, but will not appear in the retrospective questioning method. Person *f* moves from *i* to *k* and from *k* to *j*. Both these migratory moves are to be registered, while retrospective questioning will make evident only migration from *i* to *j*. Return migrations (*g*) will not be accounted for in the retrospective questioning, but, on the other hand, will be registered twice. This highlights the basic difference: current registration gives the count of migrations performed, while census studies yield information on the number of migrants, and more precisely – on the number of persons who lived until the end of the period analysed, did not emigrate abroad and whose place of residence at the beginning is different from that at the end. This number will additionally be increased by all those who come from abroad within the period in question. The number of migrations is higher than the number of migrants. In Polish practice it should be taken into consideration that in the census inquiry those who are registered for temporary residence and stay in the place of their new residence longer than two months are treated as migrants, a fact which may disturb the previously given relation.

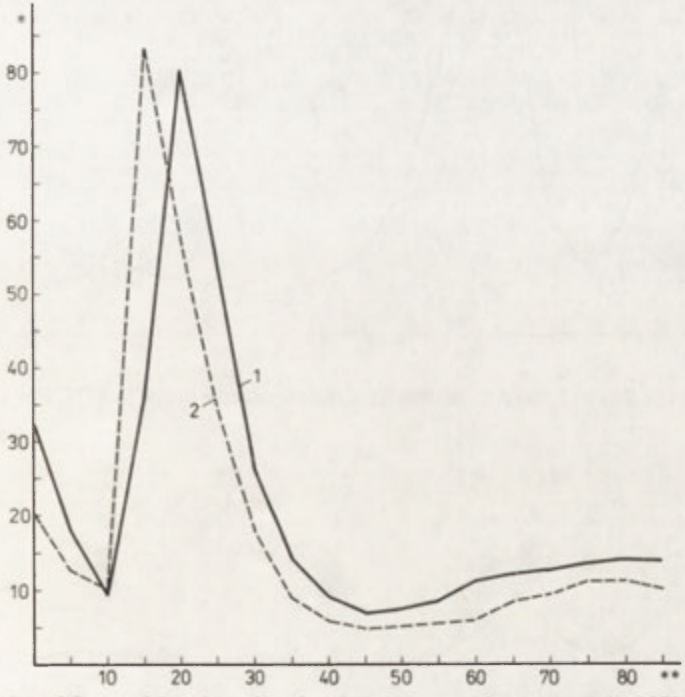

Fig. 2. Intensity of flows of females migrating from countryside to towns in 1978: 1 – data on migrations, 2 – data on migrants, * – intensity (x 1000), ** – age

Figures 2 and 4 show the similarities and differences displayed by the curves of intensity of population migratory movements as measured by numbers of migrations and migrants, respectively per 1000 women, while Figs 3 and 5 show the same phenomena per 1000 men. This problem is separately commented upon for rural-urban and urban-rural migrations.

Thus, for the rural-urban movements the intensity of migrations in the first two age groups is importantly higher than the number of migrants (Figs 2 and 3). Since migrations of children are strongly connected with migrations of whole families, the result displayed may indicate a low "apartment stability" of young couples or, what is

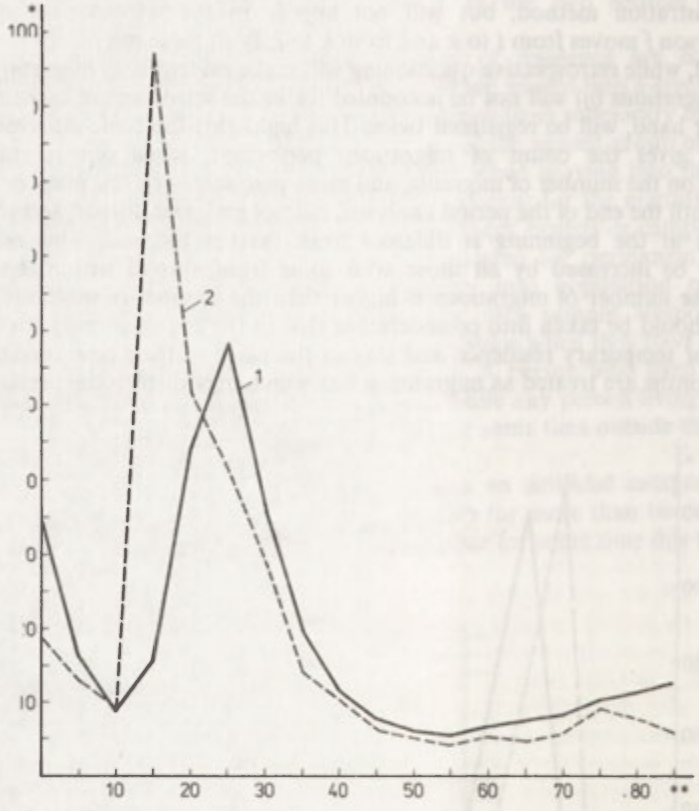

Fig. 3. Intensity of flows of males migrating from countryside to towns in 1978. For key see Fig.2

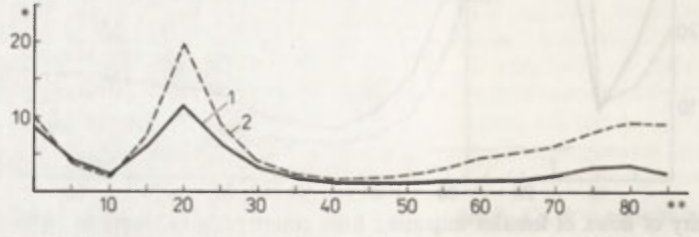

Fig. 4. Intensity of migrations of females from urban to rural areas in 1978. For key see Fig. 2

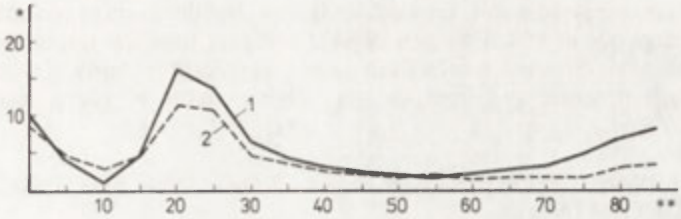

Fig. 5. Intensity of migrations of males from urban to rural areas in 1978. For key see Fig. 2

more probable, it may be the effect of changing the residence status from temporary to permanent. The latter fact had to be accounted for in the current registration but, simultaneously, was neglected in the census inquiry.

A very characteristic phenomenon can be observed for the age group of 15–19 years. Namely, the intensity of the flow of migrants is 90.2 per 1000 inhabitants, while the intensity of migration is 25.4 per 1000. These differences become even greather when only male migrations are considered. Respective values are then 96.9 and 15.5. This phenomenon is related to the mass migration of rural youth to urban areas. Young people looking for jobs or starting secondary and university education are in the first period of their city life usually registered for temporary residence, and therefore their moves are as yet unrecorded in the current registration. Similar differentiation, although smaller in scope, can also be observed in the subsequent age group. Attention should be paid to the fact that migrants of 15 to 25 years of age constituted 69.9% of all those with temporary residence status in 1978. Maximum of flow intensity occurs for various age groups, depending upon the type of information used. With the census data the maxima occur for earlier age groups than with current registration data, the difference being 5 years for women and 10 years for men.

Urban-rural migratory flows (Figs 4 and 5) display a much lower intensity than flows in the opposite direction. Numbers of migrations are almost invariably superior to numbers of migrants per 1000 inhabitants. This is caused by a low intensity of population movement in this direction for a definite time. Maximum intensity of migrations and of the flow of migrants occurs within the 20–25 years age group. The feature which distinguishes this pattern from the one for migratory flows in the opposite direction is the lack of a well-pronounced migration peak for the youth of 15–19 years of age. Simultaneously, maximum intensity of migrations of men, in terms of migration numbers, from urban to rural areas, occurs for men who were 5 years younger than when they migrated in the opposite direction.

This can probably be explained by the fact that in the case of urban-to-rural movements one is mostly dealing with the returns to villages of young people who have completed their education or gained a profession.

The average age of a migrant (see Table 1) is lower than the average age at which migration occurs, which results from the flow intensity distribution along age, as

TABLE 1. Average age of a migrant and average age at the moment of migration. Distinction of urban and rural regions, 1978

Direction of flow	Migration		Migrants	
	men	women	men	women
Urban-to-rural	25.39	29.16	24.13	24.47
Rural-to-urban	24.76	26.15	23.01	24.30

Source: own calculation based upon the data from the Central Statistical Office.

commented above. Besides this, the table indicates that the average of female migrants and the average age at which women migrate is higher than the respective indices for men, the phenomenon which results from quite a significant mobility of women at older ages, their age-structure and from the very high mobility of young men.

3. A COMPARISON OF PROJECTION RESULTS OBTAINED FOR TWO TYPES OF MIGRATORY DATA

The present chapter is devoted to a comparision of the results obtained from the generation of projections for two types of migratory data. Since the methodology used, i.e. the Rogers' model (1975), is widely known, it will not be presented here. It should only be emphasized that depending upon the type of migratory data slightly different methods of estimating the multiregional life tables were used (see Willekens and Rogers 1978).

The projection algorithm yielded through its functioning information on the number of population in any of the regions for 5-year periods. Projection results are shown for time horizons of 5, 30 (one generation) and 60 (two generations) years from the starting point of 1978, and also for stable population. Calculations were performed in two variants: with the National Census data, providing numbers of migrants (census data; Table 2) and with the current registration data, providing migration numbers (registration data; Table 3). Each projection was made separately for the whole of the population and for women.

In both projections an increase over time in the total population number and in the number of women appeared. After 5 years a stronger increase is indicated for the census data, while for the long-term projections a stronger increase occurs for the registration data. Summary results of these projections are given in Table 2 and 3.

Large-scale population movements from rural to urban areas are not only an interesting phenomenon, but also a process of essential importance for future demographic and social policies. This process has been observed for many years. According to anticipations the two projections show a monotonous increase in urban population, accompanied by the decrease in rural population numbers. In 1978 57.52% of the population were living in cities, with 58.33% for women, while in 1983: for the projection of the census data – 60.69%, for the projection of the registration data- – 60.32% (women, respectively, 61.10% and 61.19%), then in the year 2008 – 71.48%, and 69.22%, in 2038 – 77.24% and 73.43%, and finally, after stable population has been achieved there should be 80.19% (census data) and 75.87% (registration data) of the population in urban areas.

Taking into account, additionally, the age structure changes commented upon farther on, the results given are a very serious warning – a decrease in the numbers and ageing of the rural population is to be anticipated.

The speed of population increase, measured by the growth ratio λ displays a downward tendency from 1.05 for the period 1978–1983, for both types of the data, down to values between 1.001 and 1.005, 60 years later. The regional differentiation of this ratio is even bigger. In particular, for the rural population, the magnitude of λ is below 1, but it is increasing, meaning that the decrease in the rural population will gradually slow down. The stabilized demographic system, according to projections obtained, is characterized, excepting the registration data for the total population, by a value below 1.0, which means an eventual population number decrease.

In consecutive stages of projections it can be seen that this population is ageing and that the proportions among various age cohort shares do change. Over the period of 60 years the average age of the population will increase by 4.83 years according to the census data, or by 4.44 years, according to the registration data. This indicator grows

even quicker for women, i.e. by 5.15 and 4.88 years, respectively. There is an important difference in the speeds of increase in the populations average age in urban and in rural areas. For the overall 60 year period this increase, calculated for the total population in rural areas will be, according to the census data, 3.98 years, and according to the registration data, 2.53 years, while as calculated for women, respectively 3.48 and 2.98.

In urban areas, the corresponding numbers will be 5.18 and 5.22, 5.78 and 5.58. It can generally be said that urban population and women will age quicker, and that projections based upon census data indicate a quicker ageing than do those based upon the current registration data.

When analysing the shares of three basic age groups: children and youth, productive age population and retirement age population, one can state that, with time, the shares of the first two groups diminish, while that of the third increases. Some deviations from this rule can be observed within the period between the projections' 60th year and the demographic system's stabilization time. Within 30 years it can be anticipated that the share of post-productive population will increase from 13.19% to 16.08%, according to the census data, and to 15.93% (registration data), while the share of children and young people will diminish from 32.38% down to 28.72% (census data), or 29.08% (registration data). After the next 30 years there will be a further windening of the gap. In the countryside, where there is a higher share of older people than in towns at the starting point of projections, population generally ages with time as well, but much slower than in urban areas. Simultaneously, the share of the first, youngest age group is also diminishing slower than in urban areas.

It can therefore be expected than a deterioration in the demographic situation in towns will be proceeding at a greater speed than in the countryside, which, however, does not mean that the demographic future of rural areas should be treated carelessy: this future still appears worse than for urban areas, primarily because of the persisting mass migrations of young people from the countryside to towns.

4. FORECASTING OF CHANGES IN SPATIAL DISTRIBUTION OF POPULATION WITH THE ROGERS MODEL

Both the model developers, Frans Willekens and Andrei Rogers (see Willekens and Rogers 1978), and its later users, e.g. Termote (1980), do not consider the model appropriate for direct predictive use. Having in mind stricly formal projective assumptions, the Rogers model can only generate warning forecasts, i.e. the ones which answer the question "what will happen if present demographic trends do not undergo changes in the future?". In practice, however, a projection is very often equated with prediction, in spite of the fact that respective authors are perfectly aware of the differences between these two notion (see Keyfitz 1972). M. A. Stoto in his paper (1983, p. 13) concerning the accuracy of demographic projections puts it bluntly: "... we regard all projections as predictions and therefore talk about the accuracy population projections, interpreted as predictions", notwithstanding a remark elsewhere, by the same author, that projection and prediction are not the same notions. In the present paper, following N. Keyfitz and M. A. Stoto, projection is treated as if it were prediction, with a full awareness of the inadequacy of the two notions. This means the acceptance of certain limitations to the model, these limitations therefore imposed on prediction, and related to such assumptions as: the stationarity of natural and migratory demographic processes, homogeneity of population within one age group, Markovian nature of temporal changes and, finally, closedness of the migratory processes. It is obvious that these assumptions do not hold in reality.

Thus, further on, an attempt at assessing the Rogers model as a forecasting model is

TABLE 2. Main features of the projection based upon the census data. Distinction of urban and rural regions

Specification	Year	Total population			Women		
		Poland	urban areas	rural areas	Poland	urban areas	rural areas
Population numbers, in 10^3	1978	35081	20178	14903	17992	10492	7500
	1983	36742	22298	14444	18838	11510	7328
	2008	41667	29784	11882	21272	15093	6178
	2038	43623	33695	9928	22228	17003	5225
	stable equivalent	46247	37086	9162	24388	19407	4981
Average age	1978	32.92	32.74	33.17	34.39	34.27	34.55
	1983	33.37	33.02	33.90	34.91	34.66	35.31
	2008	36.15	35.82	36.96	37.70	37.61	37.92
	2038	37.75	37.92	37.15	39.54	40.00	38.03
	stable equivalent	38.11	38.55	36.36	39.99	40.71	37.15
Growth ratio λ	1978 – 1983	1.0473	1.1051	0.9692	1.0470	1.0970	0.9771
	2003 – 2008	1.0218	1.0453	0.9674	1.0217	1.0442	0.9708
	2033 – 2038	1.0019	1.0099	0.9758	1.0010	1.0087	0.9766
	stable equivalent	0.9970	0.9970	0.9970	0.9948	0.9948	0.9948
Regional share, %	1978	100.00	57.52	42.48	100.00	58.32	41.68
	1983	100.00	60.69	39.31	100.00	61.10	38.90
	2008	100.00	71.48	28.52	100.00	70.95	29.05
	2038	100.00	77.24	22.76	100.00	76.49	23.51
	stable equivalent	100.00	80.19	19.81	100.00	76.49	23.51

Children and youth up to 19 years of age, %	1978	32.38	30.65	34.73	30.78	28.76	33.62
	1983	31.71	29.89	34.52	30.17	28.14	33.37
	2008	28.72	27.58	31.57	27.22	25.65	31.05
	2038	27.59	26.33	31.84	25.92	24.23	31.43
	stable equivalent	27.18	25.88	32.44	25.41	23.68	32.15
Population in productive age 20-59 years, %	1978	54.43	57.53	50.25	53.78	56.98	49.29
	1983	54.57	58.02	49.25	53.60	57.14	48.04
	2008	55.20	57.75	48.81	54.07	56.88	47.20
	2038	52.54	54.21	46.89	51.12	52.87	45.39
	stable equivalent	52.05	53.20	47.36	50.57	51.77	45.87
Elderly people, 60 and more years of age, %	1978	13.19	11.82	15.03	15.44	14.26	17.09
	1983	13.72	12.09	16.23	16.23	14.73	18.60
	2008	16.08	14.67	19.62	18.71	17.47	21.75
	2038	19.87	19.46	21.27	22.97	22.90	23.18
	stable equivalent	20.77	20.92	20.19	24.02	24.55	21.99

Source: own calculation based upon the data from the Central Statistical Office.

TABLE 3. Main features of the projection based upon the current registration data. Distinction of urban and rural regions

Specification	Year	Total population			Women		
		Poland	urban areas	rural areas	Poland	urban areas	rural areas
Populations numbers, in 10^3	1978	35081	20178	14903	17992	10492	7500
	1983	36731	22157	14574	18831	11522	7309
	2008	41819	28949	12870	21307	15026	6281
	2038	44371	32581	11790	22431	16806	5631
	stable equivalent	44908	34073	19835	23676	18245	5431
Average age	1978	32.92	32.74	33.17	34.39	34.27	34.55
	1983	33.34	33.10	33.71	34.89	34.63	35.31
	2008	35.96	36.28	35.26	37.58	37.76	37.14
	2038	37.36	37.96	35.70	39.27	39.85	37.53
	stable equivalent	37.66	38.34	35.54	39.63	40.31	37.34
Growth ratio λ	1978 – 1983	1.0470	1.0980	0.9779	1.0466	1.0981	0.9746
	2003 – 2008	1.0230	1.0424	0.9819	1.0223	1.0426	0.9770
	2033 – 2038	1.0048	1.0106	0.9890	1.0026	1.0082	0.9864
	stable equivalent	1.0008	1.0008	1.0008	0.9975	0.9975	0.9975
Regional share, %	1978	100.00	52.52	42.48	100.00	58.32	41.68
	1983	100.00	60.32	39.68	100.00	61.19	38.81
	2008	100.00	69.22	30.78	100.00	70.52	29.48
	2038	100.00	73.43	26.57	100.00	74.90	25.10
	stable equivalent	100.00	75.87	24.13	100.00	77.06	22.94

Children and youth up to 19 years of age, %	1978	32.38	30.65	34.73	30.78	28.76	33.62
	1983	33.74	29.78	34.73	30.19	28.06	33.55
	2008	29.98	27.30	33.08	27.44	25.59	31.87
	2038	28.17	26.48	32.88	26.36	24.53	31.93
	stable equivalent	27.81	26.19	32.92	25.78	24.10	31.83
Population in productive age, 20-59 years, %	1978	54.43	57.53	50.25	53.78	56.98	49.29
	1983	54.57	58.10	49.22	53.61	57.31	47.78
	2008	54.99	57.66	49.01	53.97	57.04	46.65
	2038	52.42	54.13	47.69	50.63	52.46	45.05
	stable equivalent	52.00	53.36	47.73	50.60	52.17	45.35
Elderly people, 60 and more years of age, %	1978	13.19	11.82	15.03	15.44	14.26	17.09
	1983	13.69	12.13	16.06	16.20	14.63	18.67
	2008	15.93	15.05	17.91	18.58	17.37	21.48
	2938	19.41	19.40	19.43	23.01	23.01	23.03
	stable equivalent	20.19	20.45	19.35	23.52	23.73	22.82

Source: own calculation based upon the data from the Central Statistical Office.

TABLE 4. Age structures of population for both sexes together: according to real data, to projections with the Rogers model and to forecasts prepared by the Central Statistical Office

Age	Real data population, 1983 Numbers in 10^3	Rogers model				GUS forecast	
		Census data		Registration data			
		population in 10^3	in % of real population numbers	population in 10^3	in % of real population numbers	population in 10^3	in % of real population numbers
				Polish totals			
0–4	3406	3300	96.89	3309	97.15	3331	97.80
5–9	3155	3115	99.36	3114	99.33	3142	100.19
10–14	2701	2700	99.96	2700	99.96	2706	100.19
15–19	2530	2536	100.24	2536	100.24	2535	100.20
20–24	2916	2929	100.45	2928	100.41	2921	100.17
25–29	3393	3409	100.47	3408	100.44	3400	100.21
30–34	3220	3235	100.37	3234	100.43	3230	100.31
35–39	2376	2384	100.34	2383	100.29	2382	100.25
40–44	1889	1889	100.53	1899	100.53	1896	100.31
45–49	2284	2091	100.34	2091	100.34	2092	100.38
50–54	2141	2149	100.37	2149	100.37	2151	100.47
55–59	1945	1955	100.51	1954	100.46	1955	100.51
60–64	1525	1531	100.39	1530	100.33	1539	100.92
65–69	962	962	100.00	960	99.79	966	100.42
70–74	1123	1120	99.73	1119	99.55	1122	99.91
75–79	787	786	99.87	783	99.49	785	99.75
80[a]	612	640	104.58	636	103.92	592	96.73
Totals	36174	36742	101.58	36731	101.53	36743	101.58

			Urban areas				
0–4	1952	1891	96.88	1905	97.59	1924	98.52
5–9	1840	1772	96.30	1833	99.62	1849	100.49
10–14	1500	1488	99.20	1503	100.20	1506	100.40
15–19	1455	1513	103.99	1537	93.26	1488	102.20
20–24	1731	2018	116.58	1837	106.12	1807	104.33
25–29	2133	2232	104.64	2258	105.86	2204	103.28
30–34	2145	2157	100.56	2208	102.94	2157	100.56
35–39	1601	1604	100.19	1621	101.25	1612	100.69
40–44	1229	1234	100.41	1242	101.06	1241	100.98
45–49	1295	1299	100.31	1304	100.69	1305	100.77
50–54	1272	1277	100.39	1282	100.79	1283	100.86
55–59	1109	1116	100.63	1120	100.99	1120	100.99
60–64	829	835	100.72	838	101.09	842	101.57
65–69	506	509	100.59	509	100.59	515	101.78
70–74	585	589	100.68	587	100.34	588	100.54
75–79	409	416	101.71	411	100.49	412	100.73
80[a]	326	347	106.44	342	104.91	316	96.93
Totals	21917	22978	104.84	22157	101.10	22170	101.15

			Rural areas				
0–4	1454	1409	96.91	1404	96.56	1406	96.77
5–9	1295	1343	103.71	1281	98.92	1293	99.85
10–14	1201	1212	100.92	1197	99.67	1200	99.92
15–19	1075	1023	95.16	1179	109.67	1046	97.48
20–24	1185	911	76.88	1091	92.07	1114	94.09
25–29	1260	1177	93.41	1150	91.27	1196	95.00
30–34	1075	1078	100.28	1026	95.44	1073	99.81
35–39	775	780	100.65	762	98.32	767	99.35
40–44	660	665	100.76	656	99.39	654	98.94
45–49	789	792	100.38	787	99.75	787	99.75
50–54	869	872	100.35	867	99.77	868	99.88
55–59	836	839	100.36	834	99.76	835	100.00
60–64	696	696	100.00	692	99.28	698	100.29
65–69	456	453	99.34	451	98.90	450	98.68
70–75	538	531	98.70	531	98.70	535	99.44
75–79	378	371	99.15	373	98.68	374	98.94
80[a]	286	293	102.45	294	102.80	276	96.50
Totals	14828	14444	97.41	14574	98.29	14574	98.29

[a] Because of data availability the oldest age group accounts for all persons at and above 80 years of age.

Source: A Concise Statistical Yearbook 1984, Demographic Forecast for 1980–1985, Warsaw 1980, and own calculations based upon the data from the Central Statistical Office.

presented. Such an assessment can be based upon a variety of criteria. One of the criteria commonly used is the accuracy of the *ex post* forecasts as compared with the actual course of events (Stoto 1983), an alternative being a comparison with the forecasts obtained by different or similar methods. The first criterion was used in the comparison of the projection results for 1983 with the actual state as of December 31st, 1983, illustrated here by the contents of Table 4: actual population numbers and per cent shares according to the regional breakdown used for Polish totals, as well as the same indicators obtained from the demographic projections into the future and their comparison with the real data. It can be concluded from this table that projections give quite accurate results for the total population, irrespective of the way in which data concerning migrations were acquired. An error below 2.0% over 5 years can be considered acceptable. According to naticipations, however, the situation is different in particular regions.

Thus, a slightly better accuracy was obtained with current registration data and for urban areas. Differences are quite small, though, and cannot constitute a practical basis for drawing conclusions.

As mentioned before, a comparison of real and projected population numbers for particular age groups in case of Polish totals indicated that projection results are a good approximation of the real situation. Excepting the first and the last age groups the error does not exceed 1%, irrespective of the data acquisition method. Projection yields greater than real population numbers in central age groups (from 15 to 65 years), and in the last group, and it gives lower than real population numbers in other groups.

Similarly, for both regions considered there is a displacement of the age structure for the extremal groups. The differences are from 3% up to 8%. Since the number of persons in the youngest age group depends solely upon the births and deaths of children born in the 5-year period, the projection undershoot results from the birth number increase in the years 1978 – 1983 (675.0 thousand births in 1978, and 720.0 thousand births in 1983), and from the infant mortality decrease from 22.5 per 1000 in 1978 to 19.3 per 1000 in 1983. The error thus committed clearly unveils the basic shortcoming of all models based upon the assumption of the constancy of natural and migratory demographic processes over time.

It is interesting to note the errors in the age structure for particular regions, appearing for age groups from 15 to 29 years of age. Errors above 3% can be seen for the results of both (the census data and the registration data) projections. Maximum errors appearing for both sexes together are: in the case of urban areas + 16.58% (age group 20 – 24 years), the census data, and + 6.74% (15 – 19 years), the registration data, and in the case of rural areas, respectively: – 23.12% and +9.67%. Usually, projections tend to overestimate population numbers in towns and to underestimate population numbers in the countryside. The greatest errors occur for the most mobile population groups and they are bigger for the data concerning migrants than for data concerning migrations. This indicates that either both the data on migrants and on migrations were overestimated, or there is a built-in mechanism in the model, which generates unduly the significance of the population's migratory movements. Introduction of the real migration coefficients instead of the model-defined ones for the age groups 15 – 19 and 20 – 24 has given considerable improvement in the accuracy of all the cross-sections considered.* On the other hand, when an account of the foreign migratory exchange was made, a further, although not very big improvement of accurancy for urban areas

* Which is insofar important as in the period 1978 – 1983 net migrations from rural to urban areas diminished from 199 700 in 1978 to 138 800 in 1983, i.e. from 10.7 persons per 1000 urbanities in 1978 down to 6.5 persons per 1000 in 1983, that is, almost by half.

was obtained with, simultaneously, a small loss of accuracy for rural areas (Kupiszewski 1987). After all these modifications had been introduced, there still persisted a model-generated over-estimation of the population in the "urban areas" region, and an under-estimation in the "rural areas" region. High accuracy of projections for particular age groups and Polish totals, together with discrepancies in both regions considered, is the basis for suspecting that the causes of errors are conected with the unsatisfactory quality of statistical data or with a faulty estimation of migration probabilities within the model.

A worse accuracy of projections using census data results from the fact that these data consider as definite only temporary migrants, of whom a portion change their location of residence for a relatively short period of time, but who age, according to these projections, in the region into which they migrated and not in the region of their permanent residence. In other words, it can be said that the cause for the diminished accuracy of projections is an over-estimation of the net number of migrants, by all these temporary migrants, who stay only a short time in the region of their temporary residence.

In order to assess the forecasting power of the model, the results obtained for the 5-year model-based forecast using current registration data were compared with the results of a forecast developed by the Central Statistical Office (GUS).

The following method was adopted for calculating the forecast's accuracy: projected population numbers were expressed in per cent of the actual population numbers (see Table 4), then an average annual error, in per cent, was calculated.

When analysing the precision of age structure projection within the adopted age-group-and-region setting one can easily see (Table 4) that the errors for particular regions are bigger than for the Polish totals and that these errors concentrate in the first and last age groups, and also in these age groups which are characterized by the highest mobility.

In fact, errors in the first age group (0–4 years) appear as much for the Polish totals as they do for particular regional population numbers. Forecasts underestimate numbers of children, this fact resulting from the growth of the birth rate, especially of third and fourth births, which occurred in the period 1978–1983, and which was accompanied by a simultaneous decrease in infant mortality in this period. In this respect, the GUS forecast gives somewhat smaller errors than the model-based forecasts.

Errors concerning the last age group, encompassing the persons of 80 and more years of age, are quite significant, from 3% to 5%. Model-based forecasts overestimate and the GUS forecast underestimates the population number within this age group. It can be assumed that the arrors mentioned are related to methodological difficulties in the proper estimation of the probability of surviving the subsequent forecasting (projection) periods in life tables, especially for those belonging to the oldest, open-ended age group. With the exception of the rural population forecast, insignificantly better results are obtained with the GUS prediction.

The most interesting fact is the simultaneous appearance of the greatest prediction errors for the most mobile age groups within the individual regions (Figs 6 and 7), and quite an accurate forecast for the same age groups when Polish totals are concerned (Fig. 8). This phenomenon corroborates the conviction that the main problem in the evaluation of future population numbers in a given region is the determination of migratory flows, while the forecasting of magnitudes of natural growth is usually not so difficult. Greater errors appeared in the model-based projection than in the one developed within the GUS. These errors lead in both forecasts to the overestimation of urban population and to the underestimation of the rural population. The only exception is the estimation of the number of the population within the age group 15–19 obtained with the Rogers model. An underestimation of the urban population is, in this

particular case, caused by omitting the temporary migrations when estimating migration probabilities in multiregional life tables, and accounting for them when population numbers are calculated. Attention should be paid to the fact that in the age group here considered, the greatest errors in the whole forecast occur, which is related to the fact

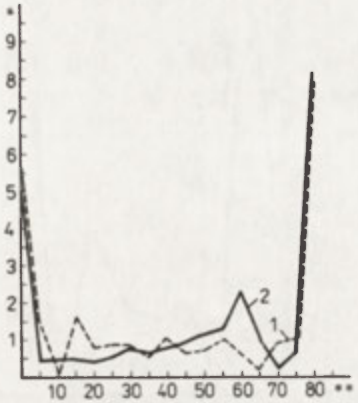

Fig. 6. Mean annual error of the GUS forecast for years 1979–1983 and of forecast based upon the Rogers model for the years 1978–1983 and for total population of Poland: 1 – model based projection, 2 – the GUS projection, * – average error in % (x 1000), ** – age

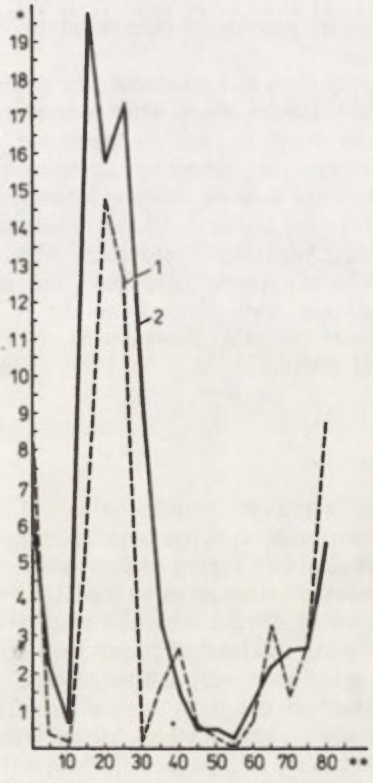

Fig.7. Mean annual error of the GUS forecast for years 1979–1983 and of the forecast based upon the Rogers model for the years 1978–1983 for rural areas. For key see Fig. 6

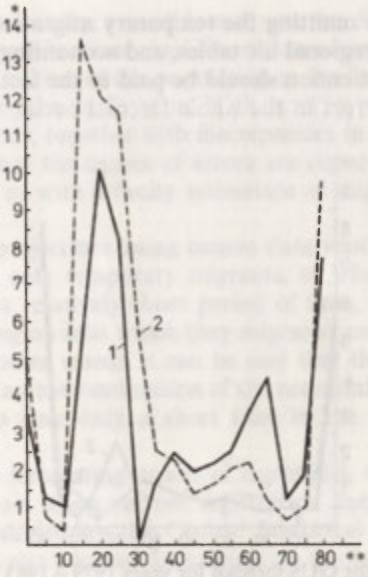

Fig. 8. Mean annual error of the GUS forecast for the years 1979–1983 and of the forecast based upon the Rogers model for the years 1978–1983 for urban areas. For key see Fig. 6

that the majority of temporary migrations concentrate in this age group, i.e. 15–19 years of age.

It is easy to conclude that there is a connection between the intensity of migration and the forecasting error, as functions of age, when comparing Figs 6 and 7 (diagrams of annual average forecasting error vs. age in particular regions) with Figs 2–5. Correlation coefficients between the vectors of migration intensity indicators and the vectors of average annual errors indicate a strong interdependence between these two kinds of phenomena, and they are highly significant. Their values range from 0.9334 for the Rogers model explaining migrations into rural areas and 0.7016 for the GUS forecast of migrations into urban areas. Once again, this proves how important, and simultaneously so far one not well grasped by the scholars, is the problem of anticipating the magnitudes of migratory flows as one of the factors determining future numbers and structures of population.

5. CONCLUSIONS

A comparision of the migration patterns obtained with various methods of measuring the migratory movements of the population indicates that these patterns differ significantly, in particular with regard to flow intensity and age structure of the migrating population. Numerical values given by the GUS, refer to various categories of persons: data on migrants were collected using the actual state criterion, while data on migrations were collected using the legal-administrative criterion. That is why direct comparison can only be made to a very limited degree.

Empirical results obtained in the study herein reported are to a certain degree inconsistent with the generally adopted methodological principles of the acquisition of data concerning population mobility. In particular, there is the principle stipulating that data collected should concern real, and not only formal movements, i.e. that the census data should be valued higher than the ones from current registration.

Census data do reflect better the real movements of the population, they are, however, charged with a significant number of temporary migrants, who migrate for brief, usually several month long, periods. In projections they are taken as "ageing" in their temporary location, while in reality they return to the locations of their permanent residence or migrate further on elsewhere. This has, of course, a disadvantageous influence on the accuracy of projections and it limits the possibilities of applying census data in forecasting models. Current registration data, although not quite methodologically correct, since they concern the formally legal status of a given person, do not have the shortcoming of overestimating the population numbers in inmigration regions and therefore they yield more accurate results.

It is practice-wise important which data should be used for population forecasts. As stated before, in the *ex post* run of the model for the period 1978 – 1983 more accurate results were obtained for the current registration data. When performing this kind of comparision one should, however, remember, that data concerning various demographic facts are put together by GUS as related to various population categories. Results obtained can only be treated as an approximation of the real state, not just merely because every forecast assumes that certain pregiven trajectories of phenomena which influence the course of this forecast are taken into consideration, but also because the data collection system is inconsistent.

The final important question is the accuracy of the forecasts generated as compared to the accuracy of GUS forecasts. It has turned out, to this author's surprise, that forecasts obtained with the Rogers model are much more precise than the GUS forecasts made in the 1970s, and similarly are as precise as the recent GUS forecast. This in evidence of the quality of the model, resulting from the consequent treament of migratory flows.

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AGE PATTERNS AND MODEL MIGRATION SCHEDULES IN POLAND

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INTRODUCTION

In the past years, studies on human spatial mobility has benefited from the greater availablity of aggregate data. Research on mobility has been broadly concerned with the estimation of migration flows, the identification of migration propensities by age, sex and other characteristics, and with explanation migration by economic and social determinants. This approach has yielded useful results, but it has also raised some new questions. One of the most important regularities observed in human migration is its relationship to age. This may be attributed to the relationship of age to other characteristics of migrants and to other aspects of the family life-cycle and work (Courgeau 1985, p. 139). As statistical schedules of the general structures of population according to the rates of age-specific fertility or mortality demonstrate, that remarkably persistent regularities are characteristic of most human populations. In demographic terminology they are known as hypothetical model schedules. Contrary to well-developed model schedules applied in analyses of fertility and mortality, similar techniques have not yet been applied in migration studies. A. Rogers and L. Castro (1981, 1985) have used those techniques, borrowing them from analyses of fertility and mortality, and applying in their most recent studies, to the modelling of migration schedules. The authors use the notion of a multi-regional model and concentrate upon the development of families of schedules according to age. Model migration schedules have been applied in a number of countries (Rogers and Castro 1985). Model migration schedules may be used to graduate observed migration data to derive summary measures for comparative analysis. They may also be used for interpretation with respect to age intervals of observed migration, to assess the reliability of empirical migration data, and to resolve problems caused by incomplete data (Drewe 1985). However, this question requires a detailed analysis and an assessment of the complexity of migration and the various forms of interdependence and possibilities for applying those models. In the light of the above remarks, it seems advisable to apply synthetic models of hypothetical migration schedules in Polish conditions on the basis of available stasistical data. In Poland, model migration schedules were primarily used to assess the temporal stability of age- and sex-specific migration (Potrykowska 1983, 1984, 1985, 1986).

AGE PATTERNS OF MIGRATION RATES

Observed schedules of age-specific migration rates tend to exhibit a striking regularity due to the fact that migration is selective with respect to age. The concepts and definitions as well as the statistical notions of migration measures, especially of

migration rates, have been borrowed from both mortality and fertility analysis for graduating age-specific schedules (Rogers, Raquillet and Castro 1978; Rogers and Castro 1981). These are the coefficients of net and gross reproduction and the gross and net migraproduction rate (GMR). This index is a basis and a common measure of the intensification of mobility defined as the expected number of migrations carried out by an individual during his lifetime.

"The simplest and most common measure of migration is the crude migration rate, defined as the ratio of the number of migrants, leaving a particular population located in space and time, to the average number of persons (more exactly, the number of person-years) exposed to the risk of becoming migrants. Because migration is highly age selective, with a large fraction of migrants being the young, our understanding of migration patterns and dynamics is aided by computing migration rates for each single year of age. Summing these rates over all ages of life gives the gross migraproduction rate (GMR), the migration analog of fertility's gross reproduction rate. This rate reflects the level at which migration occurs out of a given region" (Rogers and Castro 1981,p. 2).

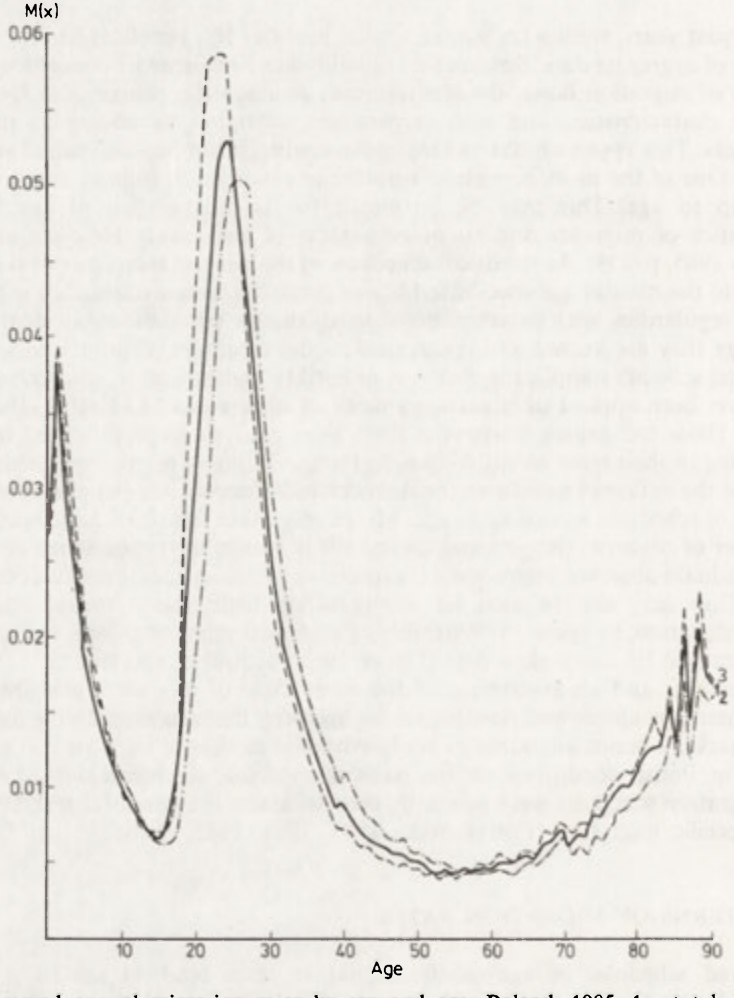

Fig. 1. Observed annual migration rates by sex and age, Poland, 1985: 1 — total, 2 — males, 3 — females

The age-specific migration schedules of multi-regional populations present remarkably persistent regularities: the highest migration rates are usually found among young adults in their early twenties, the lowest among young teenagers and retired people. The migration rates of children exceed those of adolescents. Children's migration rates also reflect those of their parents. Although migration is also sex selective, with males being more mobile than females, recent research indicate that sex selectivity is much less pronounced than age selectivity and that it is less uniform in time and space.

On the other hand, most models and studies of population dynamics (also migration measures) distinguish between the sexes. Figure 1 illustrates the age profiles of male and female migration schedules in Poland, which, however, show a distinct, and consistent, difference. The high peak of female schedule precedes that of the male schedule by an amount that appears to approximate the difference between the average ages at marriage of the two sexes.

The multinational comparative studies indicate that the level of inter-regional migration depends on the size of the areal unit selected, if the areal unit chosen is such as a county or a commune, a greater proportion of residential relocation will be included as migration than if the areal unit chosen is a major administrative division such as a state or a province. Figure 2 presents the age profiles of migration schedules in Poland, as measured by different sizes of areal units: 1) total migrations from one residence to another, 2) migrations within voivodship boundaries, 3) migration between voivodships. These profiles, remarkably similar, indicate that the regularity in age pattern persists across areal delineations of different size.

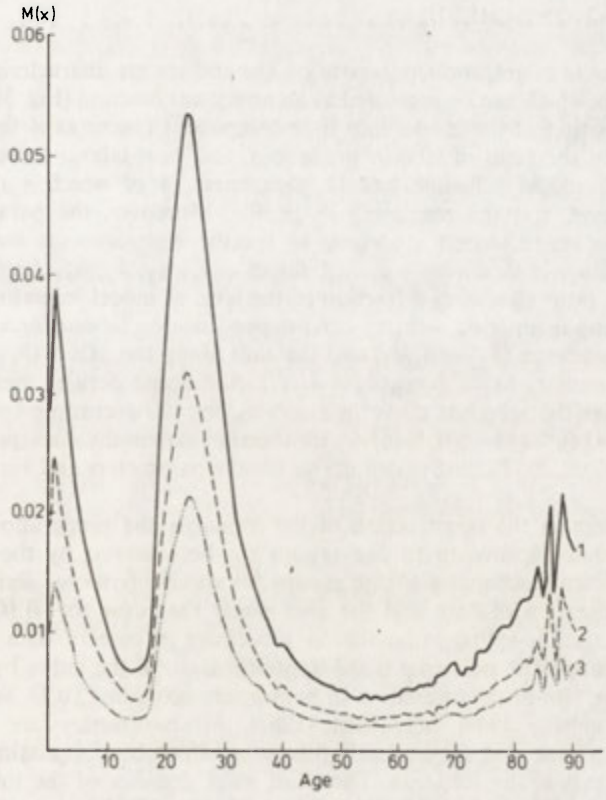

Fig. 2. Observed annual migration rates by levels of areal aggregation and age, Poland, 1985: 1 – total, 2 – intra-voivodship, 3 – inter-voivodship migration

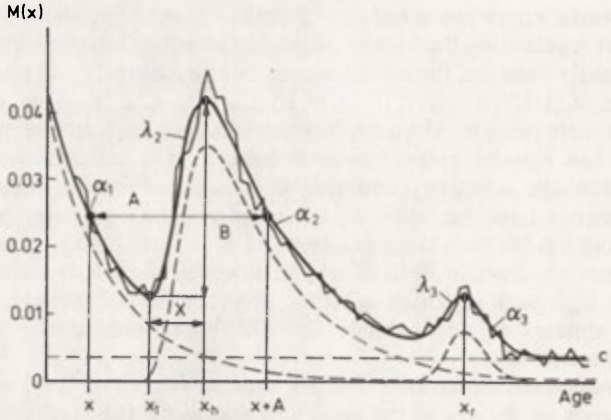

Fig. 3. The model migration schedule.
Source: Rogers and Castro 1981, p. 6 (M(x) – migration rate)

$$M(x) = a_1 \exp(-\alpha_1 x) + a_2 \exp\{-\alpha_2(x-\mu_2) - \exp[-\lambda_2(x-\mu_2)]\} + a_3 \exp\{-\alpha_3(x-\mu_3) - \exp[-\lambda_3(x-\mu_3)]\} + c \quad x = 0, 1, 2, \ldots, z$$

MODEL MIGRATION SCHEDULES

The schedules of migraproduction rates by age and sex are characterized by specific regular structure, which can be presented as an analytical function (Fig. 3). An analogue of the decomposition of the model into four component functions is the sum of four curves presenting the rates of labour, pre-labour, and post-labour forces as well as a constant. A full model schedule has 11 parameters, 4 of which – a_1, a_2, a_3 and c – define its level, and the remaining its profile. Moreover, the parameters of the equation can be characterized according to specific categories (as basic measures): height – a_1, a_2, a_3, c; locations – μ_2, μ_3; slopes – α_1, α_2, λ_2, α_3, λ_3; and as indices determining the ratio allocating a fraction of the level of model migration schedule to the constant component ($c/\delta_{1c} = a_1/c$); child dependence on labour force ($\delta_{12} = a_1/a_2$); post-labour dependence ($\delta_{32} = a_3/a_2$) and the shift along the axis x ($\beta_{12} = \alpha_1/\alpha_2$), and also labour asymmetry ($\sigma_2 = \lambda_2/\alpha_2$, $\sigma_3 = \lambda_3/\alpha_3$). Additional derived measures are: the area GMR under the schedule curve in numbers per 100 according to the basic age categories %(0–14), %(15–64), %(65+); locations of extremal values (points): $\bar{n}$, x_1, x_r, and distances (X, A, B). The list of definitions for the parameters and variables appears in Table 1.

The first stage in the construction of the model is the preparation of empirical migration schedules according to age groups, to be followed by the estimation of migration coefficients according to age groups for specific flows (or series in time and space); standardization of data and the area under the curve to 1.0 (GMR = 1); the application of a cubic-spline interpolation procedure in case of data aggregated to five-year age group. The next step is the approximation of the curve by means of the model. Here, the non-linear estimation of parameters according to D. W. Marquardt's algorithm (Levenberg 1944; Marquardt 1963). All parameters are independently determined every time and subsequently the curve, which best approximates the given schedule, is calculated by iteration. The third stage consists of the interpretation of parameters obtained, including the computation of indices and measures characterizing the empirical and model schedules.

TABLE 1. The list of the parameters and variables of the model migration schedules

gmr (obs)	Observed gross migraproduction rate
gmr (mms)	Units gross migraproduction rate
mae%m	Goodness-of-fit index E (mean absolute error as a percentage of the observed mean)
a1	a_1, level of pre-labour force component
alpha 1	α_1, rate of descent of pre-labour force component
a2	a_2, level of labor force component
mu2	μ_2, mean age of labor force component
alpha2	α_2, rate of descent of labor force component
lambda2	λ_2, rate of ascent of labor force component
a3	a_3, level of post-labor force component
mu3	μ_3, mean age of post-labor force component
alpha3	α_3, rate of descent of post-labor force component
lambda3	λ_3, rate of ascent of post-labor force component
c	c, constant component
mean age	$\bar{n}$, mean age of migration schedule
% (0–14)	Percentage of GMR in 0–14 age interval
% (15–64)	Percentage of GMR in 15–64 age interval
% (65+)	Percentage of GMR in 65 and over age interval
delta1c	$\delta_{1^c} = a_1/c$
delta12	$\delta_{12} = a_1/a_2$
delta32	$\delta_{32} = a_3/a_2$
beta12	$\beta_{12} = \alpha_1/\alpha_2$
sigma2	$\sigma_2 = \lambda_2/\alpha_2$
sigma3	$\sigma_3 = \lambda_3/\alpha_3$
xlow	x_l, low point
x high	x_h, high point
x ret.	x_r, retirement peak
x shift	X, labor force shift
a	A, parental shift
b	B, jump

Source: Rogers and Castro 1981, p. 53.

To assess the goodness-of-fit of the model schedules when the model is applied to observed data, the index E is calculated as the mean of the absolute differences between estimated and observed values and expressed as a percentage of the observed mean:

$$E = \frac{(1/n)\sum_x |\hat{M}(x) - M(x)|}{(1/n)\sum_x M(x)} 100$$

THE SPATIAL PATTERNS OF MIGRATIONS IN POLAND

The model migration schedule of A. Rogers and L. Castro has been tested in Poland (see Potrykowska 1983, 1986). The input data in a multiregional arrangement (Poland's 13 regions) for 1977 have been taken from the materials used in the study by K. Dziewoński and P. Korcelli (1981), quoted above; a full set of materials for 1978 and 1981 has been provided by the Central Statistical Office. The 13 regions have been

singled out as follows: five voivodships are recognized as individual regions, i.e.- 1 – Warsaw, 2 – Łódź, 3 – Gdańsk, 4 – Katowice, and 5 – Cracow since they are the areas of the largest inflows of population, whereas the remaining 44 voivodships are grouped into eight regions (Fig. 4). Data for 44 voivodships have been converted into those for 13 regions. The basic data are presented in Table 2. Irrespective of the crisis affecting Poland due to which migration flows in 1981 went down in comparison with the previous years, the general proportions and indices are not changed in any startling way, which has made it possible to discuss both periods together. The components of population changes should be investigated separately for highly urbanized regions (1–5), corresponding roughly to the largest urban agglomerations, and for the remaining regions (6–13). Though the population in all the regions increased in absolute numbers, these two groups show clear differences. In the first set, the net-migration is always positive, and – with the exception of the Gdańsk voivodship- – the natural increase is lower than the national average. The population growth depends there on the natural increase being higher than migration losses. In every set there are also additional differences. Among the urban agglomerations, migrations in Katowice, Warsaw and Łódź exceed the natural increase; the process is reverse in Gdańsk and Cracow. Though in the second set (regions 6–13) the net-migration is always negative, two separate groups are evident. The first one (regions 7–10, 12, 13) is characterized by high indices of growth, caused by low out-migrations, while the natural increase is either high (regions: 7, 8, 10, 13) or average (regions: 9, 12). Regions 6 and 11 form the second group, characterized by strong out-migration.

Fig. 4. Inter-voivodship migration
Source: Demographic Yearbooks 1980, 1982; Dziewoński and Korcelli 1981
1 – limits of 13 regions

TABLE 2. Basic data for the 13 regions of Poland, 1978, 1981

No.	Region	Year	Total population ,000		Natural increase	Out-migration	In-migration	Net migration		Total rate of population change
			June 30	Dec. 31	rate per thousand	number	number	number	rate per thousand	
1.	Warsaw	1978	2240	2266	5.5	32 312	51 098	+18 786	+8.4	13.9
		1981	2329	2342	4.8	29 448	43 414	+13 966	+5.9	10.7
2.	Łódź	1978	1109	1111	4.0	15 368	23 331	+ 7 963	+7.2	11.2
		1981	1134	1136	3.0	11 915	15 832	+ 3 917	+3.4	6.4
3.	Gdańsk	1978	1310	1297	11.7	34 741	41 785	+ 7 044	+5.4	17.1
		1981	1337	1345	11.0	28 269	31 253	+ 2 984	+2.2	13.2
4.	Katowice	1978	3602	3616	7.7	70 654	104 478	+33 824	+9.4	17.1
		1981	3780	3806	8.6	71 775	102 537	+30 762	+8.1	16.7
5.	Cracow	1978	1157	1142	7.8	18 124	21 671	+ 3 547	+3.0	10.8
		1981	1170	1177	7.9	16 605	19 550	+ 2 945	+2.5	10.4
6.	East-Central	1978	2942	2967	8.6	86 716	71 107	−15 609	−5.3	3.3
		1981	3005	3016	8.6	73 241	64 361	− 8 880	−3.0	5.6
7.	Northeastern	1978	2412	2407	11.9	96 297	89 980	− 6 317	−2.6	9.3
		1981	2453	2463	12.1	77 260	71 077	− 6 183	−2.5	9.6
8.	Northwestern	1978	2132	2132	13.6	82 516	79 201	− 3 315	−1.5	12.1
		1981	2180	2192	13.7	62 127	58 098	− 4 029	−1.8	11.9
9.	Southern	1978	2518	2522	9.4	63 229	59 620	− 3 609	−1.4	8.0
		1981	2563	2570	9.7	52 273	51 019	− 1 254	−0.5	9.2
10.	Southeastern	1978	4239	4266	10.9	108 844	95 582	−13 262	−3.1	7.8
		1981	4353	4372	11.0	95 370	84 171	−11 199	−2.6	8.4
11.	Eastern	1978	2494	2499	9.3	76 504	66 631	− 9 873	−3.9	5.4
		1981	2552	2561	9.7	63 996	56 737	− 7 259	−2.8	6.9
12.	West-Central	1978	4752	4757	9.8	135 693	130 161	− 5 532	−1.2	8.6
		1981	4861	4882	9.7	108 570	102 279	− 6 291	−1.3	8.4
13.	Western	1978	4098	4086	12.1	140 245	129 342	−10 903	−2.7	9.4
		1981	4179	4199	11.8	109 483	100 004	− 9 479	−2.3	9.5
	Total	1978	35009	35080	9.7	963 987	963 987			9.7
		1981	35902	36062	9.7	800 332	800 332			9.7

Source: Demographic Yearbook 1980, 1982, Central Statistical Office, Warsaw.

The spatial patterns of migrations have been relatively stable for several years. It is only the number of trips, which tends to decline because of the economic crisis. In 1981, the inter-voivodship migrations accounted for 45.2% of the total migration, the map of migration flows between voivodships and regions, presented in Figure 4 shows that three different basic zones can be identified in the pattern of moves. The first zone is a belt of western and northern regions, in which the distribution of migration flows appears as a continuous line joining together the neighbouring voivodships. In the case of Gdańsk, Olsztyn and Białystok a radial pattern of in-migration is characteristic. The belt of southern regions forms the second zone. Though migrations are concentrated mainly in the Upper Silesia (region 4) and in the Cracow region (5), the neighbouring voivodships (Kielce, Częstochowa) are also included. The third – central zone consists of two groups: one, adjacent to Warsaw (with Łódź and Lublin as supplementary centers), and the second to Poznań (with Bydgoszcz as supplementary centre). As shown in Fig. 4, there are two-way flows in the first and second zones, and this may be an evidence of a high mobility of the population and a relatively strong regional intergration; one-way flows prevail in the central zone and gererate a marked population concentration in large urban centres. The assymetric area of migrations to Warsaw is a striking feature; it is deformed in the west as a result of the vicinity of urban agglomeration of Łódź and of the industrial centre of Płock. Figure 4 shows that, as a rule, the largest migration streams are on short distances, and a large part of shifts are carried out between the neighbouring voivodships and regions.

The regional differences in the scale of migration and the components of population changes are reflected in the age structure of migrants.

MODELS OF AGE MIGRATION SCHEDULES IN POLAND

According to the definition of migration rates, this analysis of migration patterns reflects the level at which migration occurs out and into a given region. Figures 5 and 6 present the empirical schedules of out-migration rates by age. The flows are from the

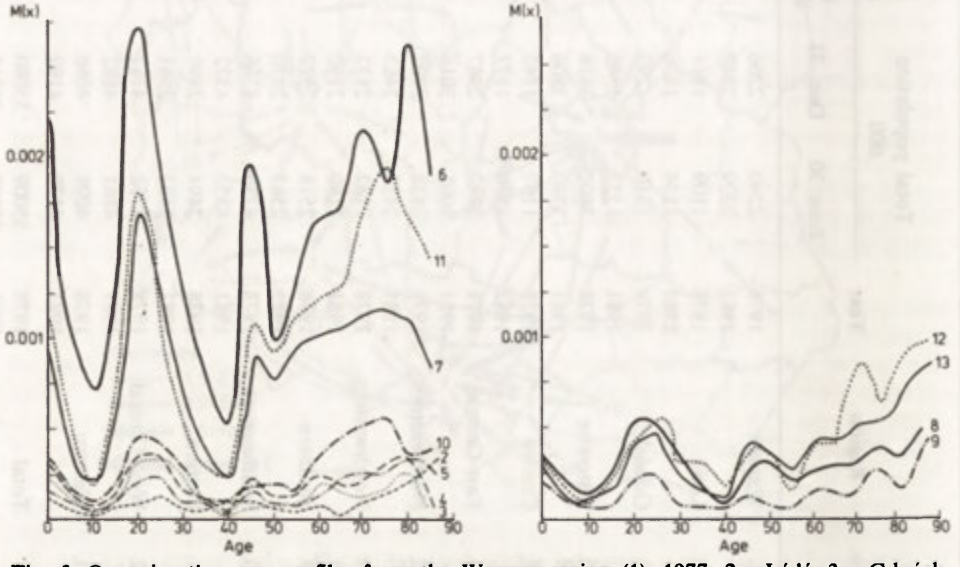

Fig. 5. Out-migration age profiles from the Warsaw region (1), 1977: 2 – Łódź, 3 – Gdańsk, 4 – Katowice, 5 – Cracow, 6 – East-Central, 7 – Northeastern, 8 – Northwestern, 9 – Southern, 10 – Southeastern, 11 – Eastern, 12 – West-Central, 13 – Western. $M(x)$ – migration rate

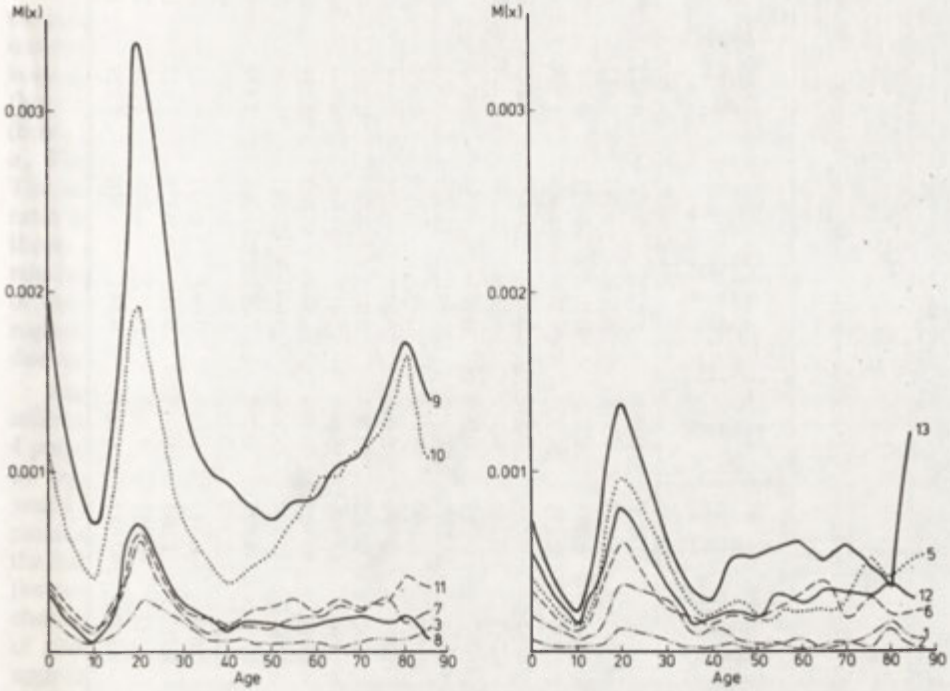

Fig. 6. Out-migration age profiles from the Katowice region (4), 1977: 1 – 13 – cf Fig. 5, $M(x)$ – migration rate

regions of Warsaw and Katowice to each of the remaining regions in 1977. These out-migrations were disaggregated into 12 destinations. As noticed above, the high mobility is connected with short distances; in the case of the Warsaw region, the largest out-migration streams are to the nearest regions: East-Central (6), Eastern (11), and Northeastern (7), while the largest out-migration from Katowice occurs to the neighbouring regions, i.e. Southern (9), Southeastern (10), Western (13) and the Cracow region (5). The schedules presented in Fig. 5 show the additional peaks describing the high out-migration of the labour force age groups (40 to 50), which can be explained by a high out-migration of the qualified persons to the neighbouring centres of the new voivodships (those established after 1975). The additional peaks described the elderly migration of people aged 60, 70 years and over. The age-patterns of the out-migration from the Katowice region are much more regular. The aggregated flows present rather regular schedules (see Fig. 3). These aggregated age patterns of out-migration from each of the 13 regions to the rest of Poland were analysed. Figure 7 presents the empirical and model schedules of out-migration rates by age from the 13 regions to the rest of Poland in 1977. Table 3 presents parameters and indices characterizing the schedules under discussion. The heights of the curve determining the labour force and pre-labour force components are reflected in the values of the parameters a_2 and a_1. The ratio a_2/a_1 indicates, respectively, the degree of the dominance of the labour force (index of "labour dominance"), and its reciprocal ($\delta_{12} = a_1/a_2$), the index of child dependence on labour force. It measures the rate at which children migrate with their parents. The lowest values of the parameter a_2, describing the level of the labour force component, are characteristic for the Warsaw and Łódź regions. These regions are the areas of strong in-migration. These two schedules present additional peaks describing the out-flows of

TABLE 3. Parametrs defining model migration schedules obtained after a cubic-spline interpolation for outflows from 13 regions, Poland, 1977

Parameters	Warsaw	Łódź	Gdańsk	Katowice	Cracow	East-Central	North-eastern	North-western	Southern	South-eastern	Eastern	West-Central	Western
a_1	0.024	0.019	0.016	0.017	0.025	0.021	0.021	0.018	0.024	0.022	0.023	0.022	0.020
α_1	0.178	0.217	0.224	0.193	0.227	0.169	0.142	0.125	0.215	0.229	0.185	0.182	0.125
a_2	0.022	0.030	0.053	0.063	0.069	0.108	0.107	0.048	0.086	0.107	0.121	0.181	0.056
μ_2	22.781	19.406	21.529	22.476	21.403	24.457	22.426	20.131	24.220	29.361	24.096	21.769	21.058
α_2	0.360	0.090	0.203	0.227	0.191	0.214	0.185	0.117	0.225	0.323	0.237	0.179	0.128
λ_2	0.146	0.582	0.318	0.265	0.340	0.198	0.243	0.332	0.227	0.152	0.219	0.314	0.304
a_3	0.011	0.006	0.016	0.015	0.008	0.012	0.002	0.016	0.005	0.003	0.014	0.005	0.025
μ_3	138.615	115.146	66.982	71.012	127.146	84.861	57.962	70.477	68.162	122.641	81.979	65.603	76.736
α_3	0.061	0.137	0.066	0.002	0.076	0.033	0.031	0.000	0.079	0.095	0.032	0.013	0.026
λ_3	0.020	0.039	0.000	0.035	0.027	0.051	0.263	0.090	0.000	0.032	0.579	0.081	0.083
c	0.002	0.003	0.002	0.003	0.003	0.002	0.002	0.002	0.004	0.003	0.003	0.003	0.002
%(0 – 14)	10.802	13.156	10.252	14.131	15.030	16.236	15.988	14.988	15.897	13.413	14.971	16.594	16.318
%(15 – 64)	45.494	47.834	40.360	52.965	52.164	65.263	64.458	49.502	56.779	66.586	65.017	59.298	50.279
%(+65)	43.704	39.010	49.388	32.905	32.805	18.500	19.554	35.510	27.324	20.000	20.011	24.109	33.403
δ_{1c}	8.072	6.303	8.215	5.556	8.194	11.741	10.728	8.907	6.088	7.283	11.501	7.434	10.266
δ_{12}	0.719	0.641	0.308	0.266	0.357	0.217	0.201	0.372	0.282	0.289	0.190	0.275	0.369
δ_{32}	0.489	0.182	0.296	0.245	0.118	0.115	0.021	0.342	0.057	0.047	0.113	0.063	0.452
β_{12}	0.497	2.406	1.106	0.848	1.185	0.791	0.767	1.061	0.956	0.710	0.778	1.017	0.981
σ_2	0.407	6.441	1.564	1.164	1.776	0.924	1.313	2.829	1.009	0.472	0.920	1.758	2.380
σ_3	0.335	0.289	0.001	13.896	0.352	1.544	−8.379	197.642	0.007	0.333	1.800	6.929	3.176

the labour force age groups of 40 to 50 (see Fig. 5). This fact is interpreted as the high out-migrations of the qualified persons, migrating with their families, to the new voivodships. The highest values of the "index of child dependency" ($\delta_{12} = 0.06 - 0.07$) in these regions also reflect migration of the families. Regions of strong out-migration (East, East-Central, and Northeast) are characterized by high values of the parameter a_2. The third basic component of the schedule refers to the elder age groups of migrants. The analogous index of post-labour dependence on labour force $\delta_{32} = a_3/a_2$, and the ratio a_2/a_3 of the dominance of the labour force, reflect the relative migration levels of those in the working ages relative to the elderly. These characteristics explain a relatively high mobility levels of the elderly in Poland. The high indices of the outflows of the oldest migrants from the Gdansk, Katowice, Northwestern and Each-Central regions, and also from other regions, seem to be associated with the return migrations, due to health or family reasons (see Korcelli and Potrykowska 1986).

Figure 8 contains the empirical and model age migration schedules, presenting inflows to and outflows from the Katowice and Warsaw regions in 1978 and 1981. Table 4 presents the parameters and indices describing these schedules; they are characterized by regularity and stability over time. The younger strata of the mature age (18 to 30 years) prevail, as shown by the respective peak of the curve and also the high values of parameter a_2. The labour force age groups of 25 to 35 account for high proportion of the inflows to the Katowice and Warsaw regions. The schedules, with the exception of the outflow schedule from Warsaw (lower values a_2 and a gentle slope of the curve), are characterized by the high values of the δ_{12} index (0.3), (the proportion and dependence of children on the labour force migrants, i.e. parents). The value of the β_{12} index approximates to 1.0 in all cases; this is an evidence of the regularity of migrants' family structure. One can notice a substantial change in the Katowice out-migration profiles between 1978 and 1981, i.e. a rapid decrease in the value of out-migration index of the labour force. This shift is explained by a relatively advantageous position of the region against other major urban regions during the crisis year of 1981. The third basic component of the schedule, referring to the elder age groups of migrants (the high indices of the outflows and inflows) points to the elderly migration. The empirical and model schedules of migration rates by age, presenting inflows to and outflows from the Gdańsk, Łódź and the Eastern regions in 1978 and 1981, are presented in Fig. 8. Regions with highest inmigration rates (Gdańsk and Łódź) are characterized by a considerable degree of regularity and stability of age schedules over time. These schedules, as well as the outflow schedule from the Eastern region, are characterized by high values of the δ_{12} index. It is likely that the high indices of the elderly migration are attributable to health and family factors. This may be true in particular with respect to elderly females. In the case of in-migration to the Eastern region which is a major out-migration area, high mobility in the oldest groups can be interpreted as return migration to regions of origin. Table 5 contains mean values of parameters and indices for the 13 regions of Poland, in 1977, 1978, and 1981. In all these schedules, the degree to which the empirical curves tally, is high, as shown by the parameters obtained, as well as the low values of residuals and schedules as such.

EXTENSIONS OF THE MODEL

The presented model schedules exhibit several patterns of migration in the elderly ages, such as a migration peak at retirement or a slight upward slope. However, some migration schedules allow for an additional peak corresponding to migration at the age of 40 – 50 or 60 – 70, and upward slope for the age of 60 years and over (see the Figs 5 to 9, the Warsaw, Katowice, Łódź, Gdańsk, Central-Eastern and Eastern regions). To provide a more accurate model of elderly migration, a new function was developed that

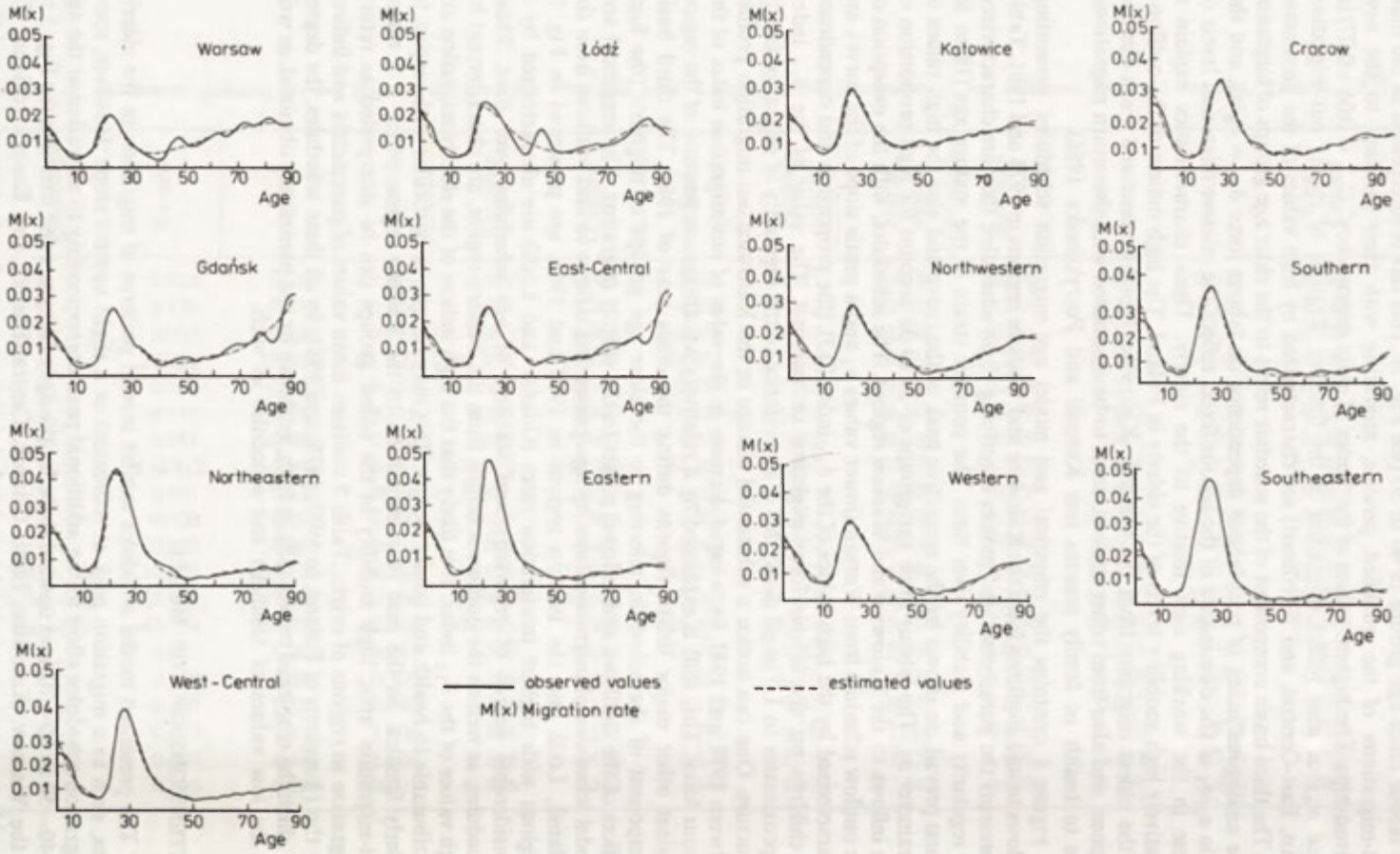

Fig. 7. Out-migration age patterns from 13 regions, 1977

TABLE 4. Parameters defining model migration schedules obtained after a cubic-spline interpolation for flows: into and from the Katowice and Warsaw regions, 1978, 1981

Parameters	Out-migration from Katowice region		In-migration into Katowice region		Out-migration from Warsaw region		In-migration into Warsaw region	
	1978	1981	1978	1981	1978	1981	1978	1981
a_1	0.0358	0.0332	0.0339	0.0389	0.0236	0.0279	0.0147	0.0177
α_1	0.1738	0.1602	0.1840	0.1853	0.1388	0.1333	0.1640	0.1645
a_2	0.1002	0.0672	0.1112	0.1014	0.0538	0.0521	0.0784	0.0754
μ_2	24.1660	22.6156	23.3214	21.3240	26.3647	23.8629	21.2361	21.8263
α_2	0.2017	0.1627	0.2093	0.1743	0.1694	0.1340	0.1689	0.1695
λ_2	0.2296	0.2665	0.2499	0.3738	0.1781	0.2264	0.3016	0.2835
a_3	0.0038	0.0111	0.0024	0.0003	0.0106	0.0063	0.0173	0.0207
μ_3	71.4282	79.9856	61.1346	21.9414	80.1861	77.6491	98.8440	88.9820
α_3	0.0324	0.2419	0.0033	0.0348	0.0377	0.0605	0.0703	0.0966
λ_3	0.0370	0.0981	0.2141	6.8243	0.0498	0.0728	0.0450	0.0703
c	0.0020	0.0030	0.0020	0.0020	0.0040	0.0030	0.0030	0.0030
% (0 −14)	22.3872	23.0969	20.9527	22.3158	20.4858	22.5094	13.3649	14.8876
% (15 − 64)	61.5477	54.2455	64.4271	64.7083	53.3689	53.8023	59.5278	57.3311
% (+65)	16.0651	22.6576	14.6202	12.9759	26.1453	23.6883	27.1073	27.7814
δ_{1e}	17.8853	11.0733	16.9617	19.4442	5.9016	9.3119	4.8860	5.8996
δ_{12}	0.3568	0.4947	0.3049	0.3835	0.4389	0.5364	0.1870	0.2346
δ_{32}	0.0384	0.1650	0.0218	0.0025	0.1975	0.1203	0.2241	0.2743
β_{12}	0.8616	0.9843	0.8793	1.0634	0.8194	0.9951	0.9709	0.9710
σ_2	1.1382	1.6380	1.1945	2.1449	1.0514	1.6899	1.7855	1.6732
σ_3	1.1439	0.4055	64.9389	196.2055	1.3218	1.2039	0.6408	0.7282

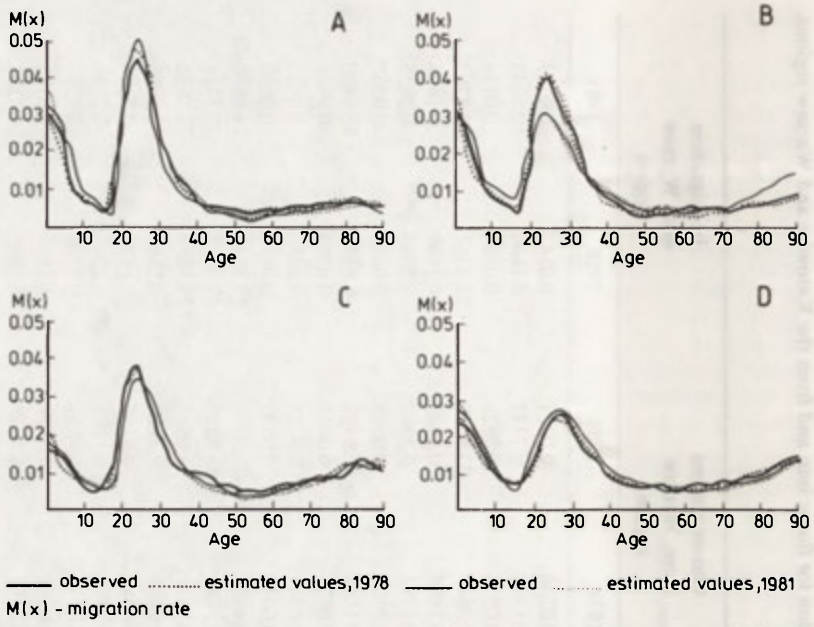

Fig. 8. Observed and model migration schedules: the Katowice and Warsaw region, 1978 and 1981: A – in-migration to the Katowice region, B – out-migration from the Katowice region, C – in -migration to the Warsaw region, D – out-migration from the Warsaw region

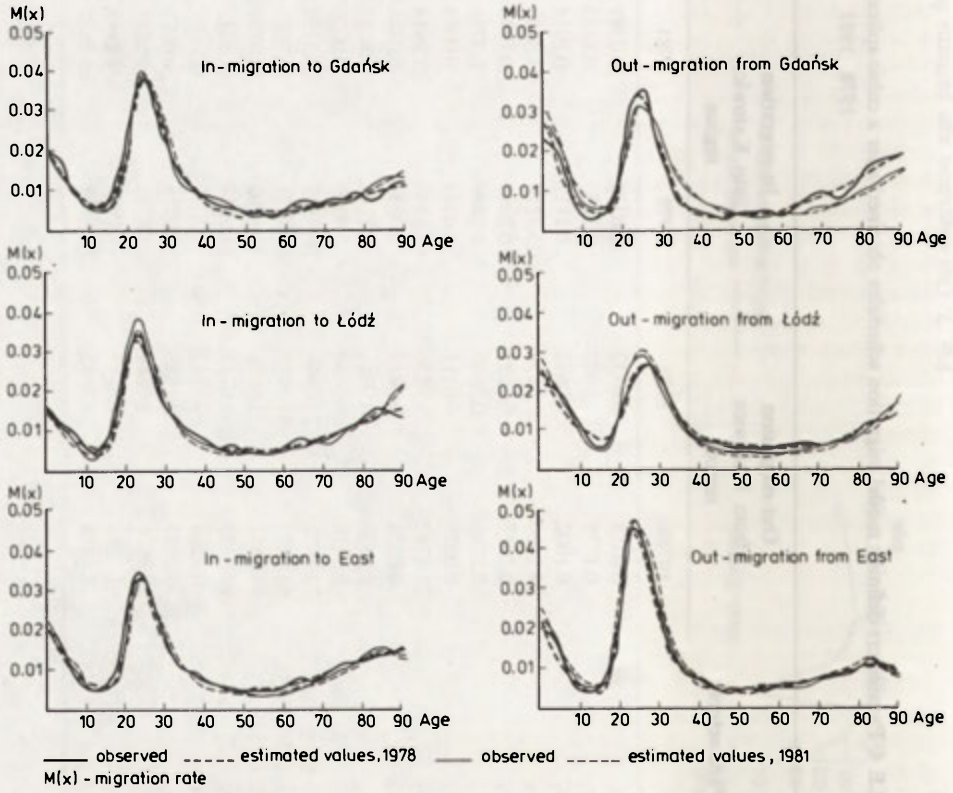

Fig. 9. Observed and model migration schedules: the Gdańsk, Łódź and Eastern region, 1978 and 1981

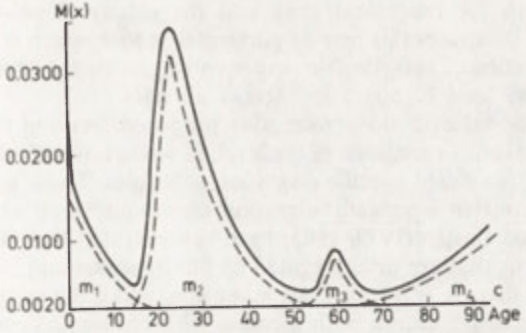

Fig. 10. The thirteen parameter model migration function.
Source: Watkins (1986), p. 10 ($M(x)$ – migration rate)

$$m(x) = m_1 + m_2 + m_3 + m_4 + c$$

where

$$m_1 = a_1 e^{-\alpha_1 x}$$

$$m_2 = a_2 e^{-\alpha_2(x-\mu_2)-e^{-\lambda_2(x-\mu_2)}}$$

$$m_3 = a_3 e^{-\alpha_3(x-\mu_3)-e^{-\lambda_3(x-\mu_3)}}$$

$$m_4 = a_4 e^{\alpha_4 x}$$

TABLE 5. Mean values of parameters defining model migration schedules, 13 regions of Poland, 1977, 1978, 1981

Parameters	In-migration to 13 regions		Out-migration from 13 regions		
	1978	1981	1977	1978	1981
a_1	0.020	0.020	0.021	0.022	0.026
α_1	0.166	0.180	0.186	0.177	0.158
a_2	0.082	0.084	0.078	0.080	0.086
μ_2	22.057	21.817	12.239	23.769	22.220
α_2	0.192	0.196	0.206	0.208	0.179
λ_2	0.283	0.299	0.280	0.246	0.299
a_3	0.025	0.015	0.011	0.014	0.012
μ_3	76.431	69.629	88.256	84.389	83.461
α_3	0.019	0.055	0.021	0.018	0.032
λ_3	0.099	0.036	0.100	0.056	0.063
c	0.003	0.002	0.002	0.003	0.003
% (0-14)	14.917	15.794	14.444	16.785	18.089
% (15-64)	56.815	56.587	55.077	56.642	57.245
% (65+)	27.846	28.322	28.171	26.571	24.664
δ_{1c}	6.666	11.000	8240	7.333	8.666
δ_{12}	0.244	0.262	0.269	0.275	0.302
δ_{32}	0.182	0.190	0.137	0.193	0.138
β_{12}	0.929	0.928	0.900	0.867	0.964
σ_2	1.473	1.525	1.359	1.263	1.670
σ_3	3.008	0.650	4.762	3.110	1.969

incorporates both the retirement peak and the elderly slope components (Watkins 1986). Figure 10 illustrates this new 13 parameter model, which is the sum of two single exponential functions, two double exponential functions, and a constant which represents a base level of migration across all ages.

Several additional extensions were also proposed focusing on population heterogeneity. They deal with variations in the level, as well as overall mobility by age pattern that produce the so called specific migration schedules. These schedules contribute in various proportions to aggregate migration curves and their changes over time and space. Rogers and Castro (1979, 1985) have concentrated their studies on age-specific migration patterns that are disaggregated by family status and by causes of migration. "For example, if divorce is a reason for migration, and if the level of migration and the number of divorces per capita both increase with economic development, should one expect a particular shift in the age profile of aggregate migration?" (Rogers and Castro 1985, pp. 188 – 189). If the age pattern of migration is influenced by its cause-specific structure, it should be possible to interpret the differences in specific age patterns of migration. For example, migration motivated by health reasons is a phenomenon characteristic of old persons, whereas education-related migration is characteristic of young people (see Fig. 11). In order to understand better why people move, it is important to disaggregate cause-specific migration data by age and sex. The different cause-specific age patterns may be interpreted within a life-cycle framework, by referring to both individual and family life cycles. This suggests an alternative way of accounting for the migration age profile i.e. family status (see Fig. 12 and Rogers and Castro 1985). The detailed specific age patterns of migration by causes and family status in Poland were presented by Korcelli and Potrykowska (1986).

Recently, D. Courgeau (1985) has developed the analysis of the relationship of age to other personal characteristics and other aspects of the family life-cycle and work. That author explored both the influence of life events on spatial mobility and the behaviour of individual birth cohorts in different social, economic, and political contents. To study the interaction of a number of interdependent relational systems: familial, economic, political, and educational, Courgeau considered their expression in time and space

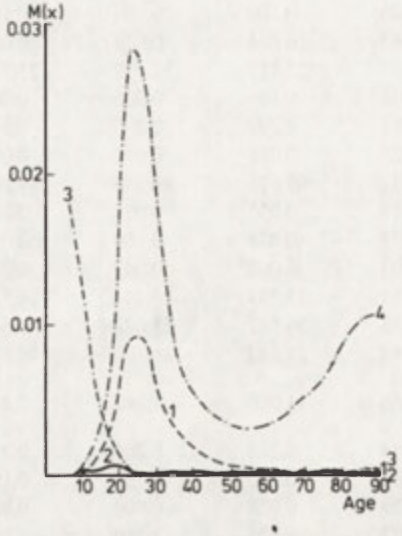

Fig. 11. Migration by cause and age, Poland, 1985. Causes: 1 – job, 2 – education, 3 – accompanying with family members, 4 – others

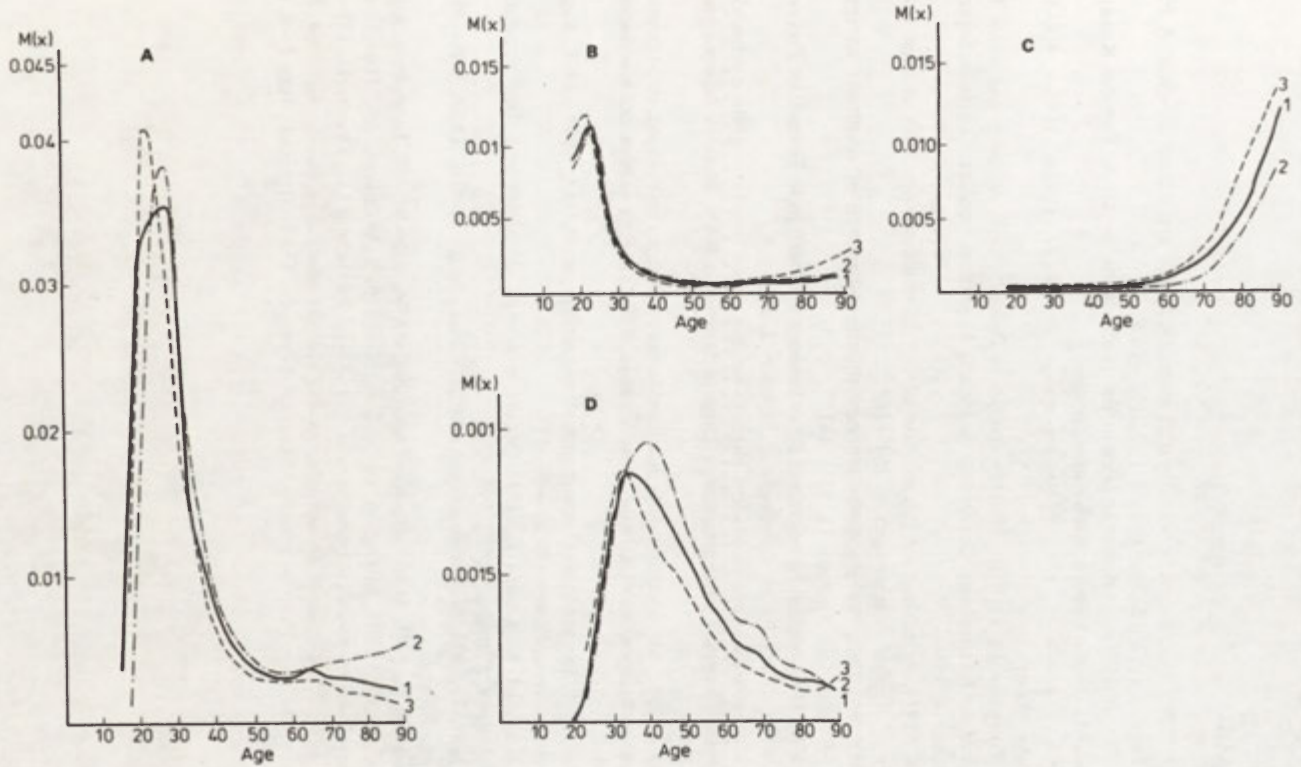

Fig. 12. Migration by marital status and age: A – married, B – never married, C – widowed, D – divorced, 1 – total migrations, 2 – males, 3 – females

through events. One of eight important questions of this study of interaction between migration and family and carreer life-cycle was the problem: "How can all the above effects explain the age profiles of migration?" (Courgeau 1985, p. 140). This is an extremely relevant statement which should be followed in future research.

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RURAL DEPOPULATION AREAS IN POLAND

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1. INTRODUCTION

The depopulation of rural areas, its speed and scale as a demographic process depends on the level of the economic development of the country and on the current economic policy, and in particular on the agricultural policy. The phenomena of rural depopulation appear in the territories of some voivodships in the western and northern areas of Poland, as well as in central and eastern Poland. Although the decrease of rural population in absolute numbers had been previously observed in some regions of the country, it was not, initially, regarded as a disadvantageous phenomenon. The time is not so remote when the main socio-economic problem in Poland was rural over-population and the need for decreasing it (Mirowski 1985). During the inter-world war years, in the 1930s, some economists estimated the overpopulatin of the Polish rural areas at about 8 million people, which amounted to, approximately, 1/3 of the overall rural population count. This overpopulation hindered the modernization of agriculture and slowed down the general socio-economic development of the country. As the result of the biological war losses and mass demographic movements just after the war, which were connected with the resettlement process, the rural over-population problem had already disappeared before 1950. Thereafter, in the 1950s and 1960s, there were still mass migrations going on from rural to urban areas, but this outflow from villages was compensated by the very high birthrates there. The rural population in Poland, although undergoing slight ups and downs, remained at the level of approximately 15 000 000 people. Under these circumstances, there were no reasons for anxiety about rural population, although the on-going decrease of the agricultural population had been a problem throughout this period. Still, when taking into account the fact that employment decrease is unavoidably linked with the modernization of agriculture, this phenomen was not regarged as disadvantageous for agricultural production. On the regional scale, however, there appeared in some particular locations population decreases in rural areas and especially so in the regions with domintaing agricultural employment, and deprived of industrial development as well as other non-agricultural job opportunities. This phenomenon did not, however, appear distinctly enough in the analyses performed on the regional level (according to the previous administrative breakdown in which Poland was divided into 17 voivodships but only in these studies which considered smaller territorial units, i.e., boroughs, communes, and new voivodships, according to the new spatial division, in force since June 1st, 1975 (Dziewoński and Kosiński 1967; Iwanicka — Lyra 1981; Eberhardt 1983).

In this study, the depopulation process in rural areas has been presented from the point of view of demographic statistics in a regional pattern, according to the division into voivodships, and the progress of this process as a succession of the development policy of the country.

2. DEMOGRAPHIC CHARACTERISTICS OF RURAL DEPOPULATION

The evolution of the Polish population in the post-war period is shown in Fig. 1 in disaggregation into three categories: total population, rural population and population in the rural depopulating areas. Starting with 1947 the total population number consistently rose, while changing tendencies can be observed in the rural areas: in some periods there were population increases, while in some other periods the population numbers diminished. In general, when comparing with the rural population level of 1946, there was an increase in the 1960s while starting with 1970, a systematic downtrend in which the growth coefficient was below 100 is to be observed. During the crisis period, i.e. 1982 — 1984, the depopulation processes generally slowed down, while more detailed analyses carried out for the level of communes indicate, however, that within the areas referred to as "depopulational" the decrease was unabated. The third curve in Fig. 1 denotes the evolution of population numbers in these rural "depopulational" areas.

The population losses in specified areas are related to both demographic processes, namely to the fact that many very numerous age cohorts enter the mobile age, and the economic processes, i.e. the transition of an increasingly large part of the labour force from sector I (agriculture and forestry), to other sectors, i.e. to industry, transport and services. In the territories where conditions for absorbing the labour surplus emerged on the spot in the non-agricultural sectors, so that there was no need to abandon rural habitats we can observe the increase in commuting from rural areas to nearby towns

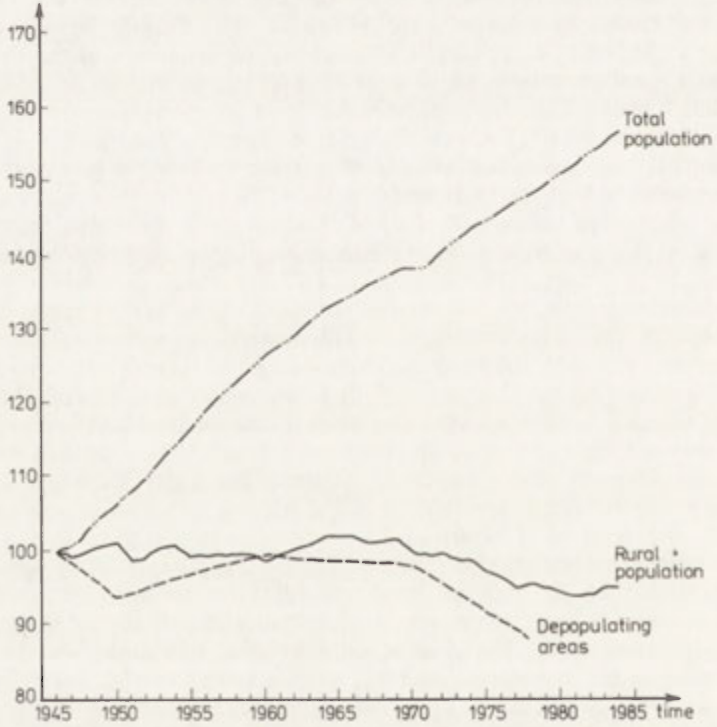

Fig. 1. The demographic growth of depopulating regions against the rural and total demographic growth in Poland, 1946 — 1984 (1946 = 100)
Source: Rocznik Statystyczny 1985, GUS, Warszawa

and the development of construction and service in the rural areas. In the regions where there were no adequate conditions for additional non-agricultural job creation, in particular for industrial development, there appeared the phenomena of the migration outflows having a higher intensity than the inflows and natural increase, which led to an absolute decrease in the population number, i.e. depopulation. These phenomena became especially acute from the beginning of the 1970s when the youth from the numerous baby-boom age groups of the early 1950s began to enter the economic activity age, while the natural increase underwent a significant drop. The economic prerequisites enhancing rural-to-urban migrations, sketched herein, caused the process which, for over three decades, transformed the image of the country and of the life of its inhabitants. Poland changed from a rural, non-urbanized country into one in which almost 60 per cent of the population is in urban agglomerations and centres. The scale of the internal migratory processes can be illustrated by the fact that during the period 1946 — 1978 the total rural population losses amounted to 5 824 100 people. During the 32-year period analysed the net urban-to-rural migration was 4 768 400 people and, if foreign migrations are added, some 6 000 000 people have left the Polish rural areas permanently. It is only due to the high natural increase that Polish rural areas were able to a large extent to compensate the population outflow to urban areas so that the total rural population decreased between 1946 and 1978 by only 1 390 300 people (Table 1)*.

TABLE 1. Net migration from Polish rural areas 1946 —1978, 1978 — 1984 (in thousands)

Years	Negative net internal migrations	Negative net foreign migrations	Overall negative net migrations
1946 — 1950	1010.0	908.7	1918.7
1950 — 1960	955.1	17.3	972.4
1960 — 1970	1200.6	71.6	1272.2
1970 — 1978	1602.9	57.9	1660.8
1978 — 1984	1183.3	53.0	1241.3
1946 — 1978	4768.6	1055.5	5824.1
1946 — 1984	5951.9	1108.5	7065.4

Source: Demographic Yearbook 1985.

The immediate post-war years were characterized by a high human mobility. At that time, 50 to 60 persons per 1000 changed their place of residence; recently this number has amounted to 20 persons per 1000. The migration which took place then involved a vast number of people leaving rural places for urban ones.

The process of settlement in the western and northern territories began; ca 2 500 000 Germans were resettled from these areas to Germany. These areas were then settled mainly by young people, among which males and single persons prevailed. A land reform was carried out (1944 — 1946). Farmers of over 50 ha were nationalized. Farmes received 6 000 000 hectares of land; 814 000 new farms were created and 254 000 existing

*When calculating the population balance one should also take into account the losses in rural population caused by administrative changes. Between 1946 and 1978 these losses amounted to 1 977 500 people who lived in 1978 in the administratively rural areas (according to the 1946 definition; Eberhardt 1985, p.35; Iwanicka — Lyra 1981).

farms were enlarged. The state farms, established in 1949, received more than 1 600 000 hectares. The land reform enabled agricultural labourers and smallholders to receive land, but on the other hand, maintained the excessive land fragmentation. Of basic importance for the pattern of migration in this period, apart from the end of the war, were the processes of settling the western and northern territories, the land reform and an intensive reconstructin of the destroyed towns and industry. The increased mobility was accompanied by a high natural increase which reflected the post-war process of compensation of births. This baby boom lasted — in both urban and rural areas — until the late fifties. In the peak period, the number of births amounted to 800 000 per annum.

After 1955, a decrease in fertility was evident, more rapid in the urban than in the rural areas. Per 1000 women aged 15 — 49, there were the following number of live births:

	1950	1955	1960	1965	1970	1975	1980	1984
urban	99	101	77	57	51	59	66	67
rural	116	118	109	88	79	90	94	93

If by the term "depopulation" one understands a decrease in the population number as a result of a negative relation between the natural increase and the net internal migration — excluding administrative changes (amalgamation of rural into urban areas), the depopulation processes in Polish rural areas (by voivodships) did not occur until the late fifties; even though intensive industrialization was being implemented and the labour force was recruited mainly in rural areas. The migration loss of rural areas was counter balanced — even with an excess — by the natural increase.

In the period of 1961 — 1965, two years of crop failures limited the purchasing power in rural areas. The industrial production was hampered, the economic balance was disturbed, however, the employment increase rate in industry was not affected. Employment in socialised economy was as follows (,000):

1950 — 4753; 1955 — 6447; 1960 — 7055; 1965 — 8331;
1970 — 9817; 1975 — 11 632; 1980 — 12 000; 1985 — 11 675;

In the early sixties, rural areas of the Kielce vivodship (Fig. 2) become a depopulation area, in which rural population constituted 70 per cent of the total. The depopulation area amounted to 6.4 per cent of the rural area on the national scale with 8.5 per cent of the total rural population. This vivodship, traditionally agricultural with small private holdings and devoid of a highly developed industry, is close to the highly industrialised Katowice voivodship, and offers work in heavy industry and coal mining.

In the next five-year period, 1966 —1970, the rate of economic growth was uneven, economic investments became scarce, and the economy stagnant. Agricultural policy was aimed mainly at the developing of the socialised sector. The barriers restricting an increase in the size of private holdings were still in force. This was not conducive to the stabilisation of farms, particularly among successors who were to take over the holdings. The labour market was being slowly saturated by the highly numerous post-war baby boom generation.

Rural depopulation areas were increasing, and embraced the Białystok, Kielce, Lublin, Łódź, Wrocław and Zielona Góra voivodships. These constituted 38.3 per cent of the total rural areas with 36.6 per cent of the rural population.

In December 1970, antoher radical change in policy — after that of October 1956 — occurred. The new political equipe gained social confidence. Economic activity was increased through an intensified industrial investments based on foreign technologies financed by foreign loans. The agricultural policy in relation to the private sector

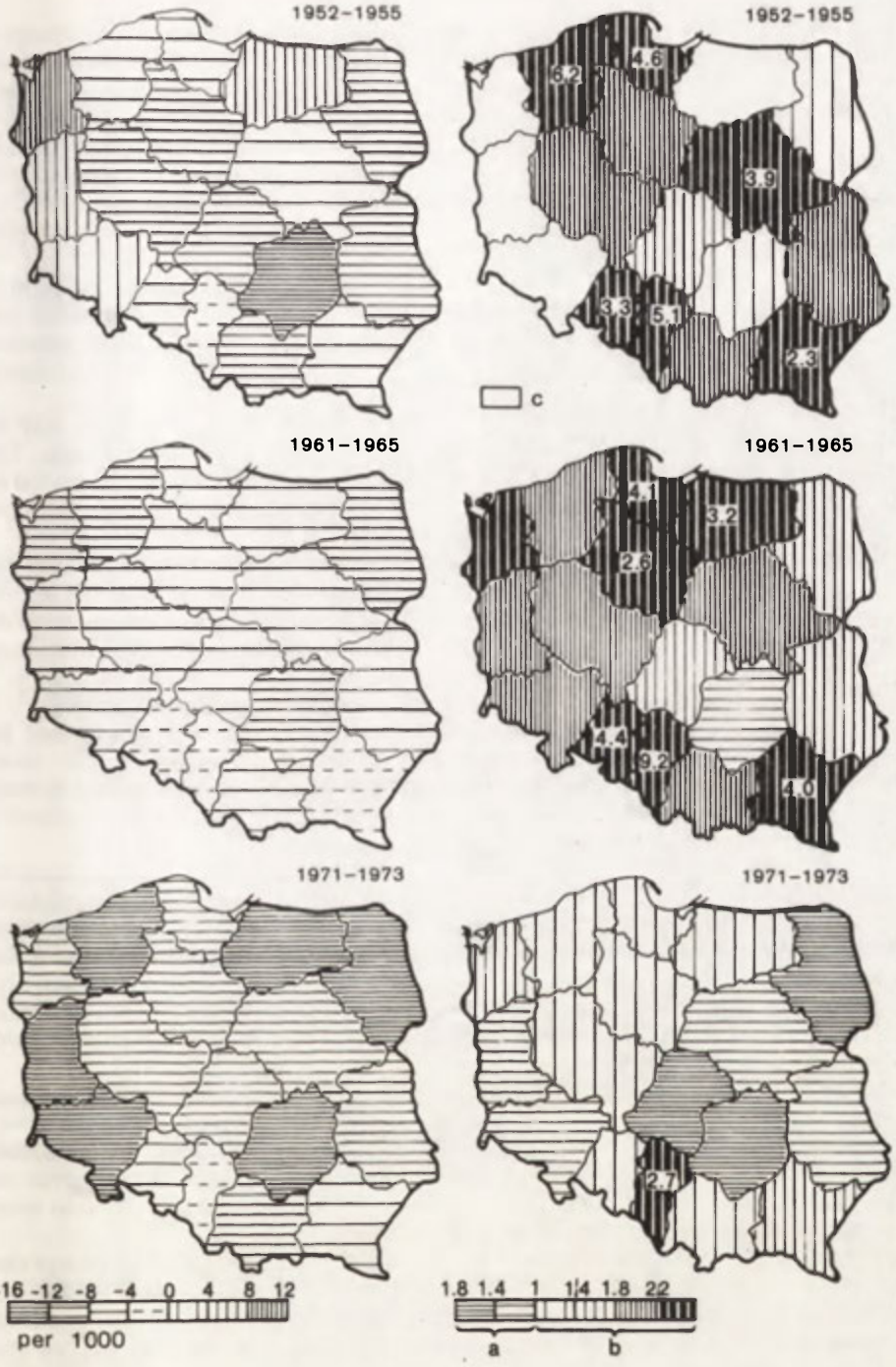

Fig. 2. Rural depopulation areas in Poland: left side : Internal net migration in rural areas; right side : Relationship between negative net migration and natural increase in rural areas: a — negative net migration > natural increase, b — natural increase > negative net migration, c — positive net migration

initially became more loose; in 1971 the prices of buying-up cattle and milk went up; in 1972 compulsory quotas of animals for slaughter and of potatoes, which hindered the specialisation of private holdings, were abandoned; in 1973, 69 per cent of the land previously in the State Fund of Land was sold to individual farmers. However, the increase in the funds allotted to industrial investments was not accompanied by the development of the socio-economic infrastructure in rural areas. The investment boom created favourable conditions for the inflow of labour force from the rural to the urban areas. The average annual net migration in rural areas amounted 187 800 at this period, with a natural increase of 174 200.

All voivodships, similarly to the previous period, had a negative net migration in rural areas (Fig. 3). High negative rates of migration occurred in the northern and western voivodships. Of these areas, which had been settled in the immeditate post-war years by young people, considerably high rates of natural increase were still characteristic.

From the point of view of the agricultural structure, these voivodships may be characterised by a higher share of socialised or state owned arable lands. The depopulation processes in these areas were not as evident as they were in the central or eastern regions, where the share of privately owned arable lands amounted 80 to 98 per cent of the total.

This does not mean that the depopulation processes in rural areas are directly connected with the level of domination of the private sector over the socialised sector. There are still some areas with small private holdings where depopulation processes do not occur (e.g. the south-eastern voivodships). Part of the rural population finds employment and commutes to work in towns.

The intensification of the depopulation processes in the eastern voivodships is a result of the unfavourable rural population structure by age and sex, involed by migration, and which resulted in a low natural increase. At the same time, these areas are less developed economically, and the creation of new voivodships resulted in their small centres sized 20 000 to 50 000, becoming development centres which attracted a rural population.

Rural areas of the voivodships in which the depopulation took place encompassed (in 1975) 73 per cent of inhabited areas by 67.4 per cent of the total rural population.

The years 1976 — 1980 were a continuation of the economic policy of the previous period. However, the centralised planning and management were unfavourable for the changing over to intensive methods of production. Excessive investment activity, unproportional economic effects and the increasing debts caused an economic imbalance. The growth production and national income slowed down and then declined which led to a crisis.

Somewhat earlier, in the years 1974 — 1976, a breakdown of agricultural production took place as result of the policy change in relation to private holdings. Newly appointed local leaders received authorisation to distribute agricultural production means (machines, tractors, fertilizers, fodder, concrete, coal) with priority given to ineffective socialised agriculture. They interfered in matters which had hitherto been taken care of by the farmers themselves.

In the late seventies, the post-war baby boom generation in rural areas entered the age of productivity. Generally the negative net migration in rural areas reached an unexpectedly high number; this number was even higher than in the first post-war five-year period. At the same time, the natural increase in rural areas reached the hitherto minimum of 815 000.

The depopulated rural areas encompassed 39 voivodships, i.e. 82 per cent of the total rural areas inhabited by 74 per cent of the total rural population.

Three eastern voivodships and especially the Białystok voivodship, were the most depopulated areas. The rural population in this area decreasd in the years 1976 — 1980

Fig. 3. Rural depopulation areas in Poland, 1974 — 1983 left side: Negative internal net migration in rural areas; right side: Relationship between negative net migration and natural increase in rural areas: a — negative net migration > natural increase, b — natural increase > negative net migration, c — 80 per cent and over of privately owned agricultural lands

from 316 000 to 292 000 while the natural increase in rural areas was the nationally lowest (4%) and net migration was near to the highest (−20.3 %). In this voivodship, there were 98 women per 100 men in rural areas. The share of the rural population in the post-productive age group was high (19 per cent of the rural population in the voivodship), considerably higher than the national average for rural areas (14 per cent).

The last period, 1981 — 1983, is characterised in the national economy by the limiting of investments; the national income (in fixed prices) in 1985 reached the level of 1975, and the net agricultural production that of the 1978 level.

In the natural increase of rural population, a slight increase of the number of births (1982 — 1984) may be observed, and also of deaths, which — beginning with 1982 — gives a decrease of the natural growth in rural areas from 11.2 to 9.1 % in 1985.

However, the size of rural depopulation areas decreased, as compared with the previous period, to 47 per cent of the rural areas inhabited by 46 per cent of rural totals.

This is a result of the economic crisis and of the difficulties in the food industry, which caused the decrease, year by year, in the rural to urban migration, and even a one-year (1982) increase in inflow from urban to rural areas.

As a result, the scale of the negative net migration to the rural areas returned to the level of the preceding fifteen years, and the number of voivodships with losses of rural population decreased to 23.

The regional, although somewhat simplified, pattern also displays the essential disproportions and spatial differentiation. With the exception of south-eastern Poland, the areas around urban agglomerations, the central part of Greater Poland and the western territoriers, all the rest of the country is a depopulation area.

The depopulation rural areas may be identified. One of them comprises neighbouring eastern voivodships, and the other — four voivodships surrounding the Łódź vivodship. Seven vivodships are characterised by a low index of natural growth in rural areas (from 4.2 to 7.9 per 1000 inhabitants), a high index of migration losses (from −11.2 to −16.0 per 1000 inhabitants), and a more than average (13.8 per cent) share of inhabitants in the post-productive age group in relation to rural population (from 15.3 to 19.2 per cent). This picture is corroborated by the map of depopulation areas provided for 1978 by P. Eberhardt (1984, 1985). In order to better analyse the reaches, intensity and characteristics by depopulation phenomena, the boundaries of regions (planning macroregions) within which the problems at hand will also be considered, are delineated on the map. This will make it possible, on the one hand, to generalize the description of the phenomena and, on the other to shift from less to more detailed spatial disaggregations as the statistical data are gathered in the analysis.

In rural depopulation areas, as a result of a long-term and high level of migration of young people, with a majority of women, the structure of population by age and sex becomes distorted (Tables 2 and 3).

The regional differences in the scale of migration and the components of population changes are reflected in the age structure of migrants. The model migrations schedules by age groups, were tested on Polish data on a multiregional scale (Poland's 13 regions — see Fig.4) for 1978, 1981 and 1984 (Rogers and Castro 1981; Potrykowska 1986). The 13 regions have been singled out as follows: 5 voivodships are recognized as individual regions: i.e. region 1 — Warsaw, 2 — Łódź, 3 — Gdańsk, 4 — Katowice, 5 — Cracow, since they are the areas of the largest inflows, whereas the remaining 44 voivodships are grouped into 8 regions (Dziewoński and Korcelli 1981 and Potrykowska — see in this volume). The migration data for 49 voivodships have been converted into those for 13 regions. Irrespective of the crisis affecting Poland, due to which migration flows in 1981–1984 had gone down in comparison with the previous years, the general proportions and indices had not been changed in any remarkable way, which made it possible to discuss both periods together.

Figure 5 contains empirical and model schedules of migration rates according to age, presenting outflows from the regions of Warsaw, Katowice, East-Central, North-

TABLE 2. Area, population, natural increase and internal net migration in Poland, 1946 — 1983

Periods	Area km²	Population at 31 Dec. (,000)		Natural increase (,000)	Internal net migration (,000)
		total	women		
		depopulation rural areas			
1961—65	18 676	1 347.0	687.0	72.0	— 73.9
1966—70	112 935[b]	5 697.8	2 883.6	259.5	—328.2
1971—73	141 156[b]	7 201.9	3 643.3	206.8	—279.0
1974—75[a]	214 373	10 220.2	5 147.8	233.1	—328.8
1976—80	240 522	10 892.4	5 457.5	590.5	—893.9
1981—83	137 675	6 873.8	3 435.1	185.2	—242.5
		remaining rural areas			
1945		16 293.0	8 696.0		
1946—51	291 993[c]	15 381.0	7 936.0	1 698.8	—1146.0
1952—55	291 993[c]	15 483.0	7 948.9	1 177.8	—399.2
1956—60	291 993[c]	15 394.2	7 902.5	1 418.3	-421.4
1961—65	273 317	14 523.0	7 398.0	983.6	-428.9
1966—70	181 595[b]	9 876.1	5 008.8	579.1	—369.4
1971—73	153 374[b]	8 161.9	4 141.8	301.4	—225.1
1974—75[a]	79 460	4 934.6	2 508.3	128.6	—105.8
1976—80	52 422	3 864.0	1 961.5	224.5	—173.3
1981—83	155 155	7 948.9	3 987.7	296.7	—207.9
		cities			
1945		7 602.0	4 261.0		
1946—51	20 316[c]	10 126.0	5 388.0	932.5	+1146.0
1952—55	20 316[c]	12 067.0	6 369.1	860.8	+399.2
1956—60	20 316[c]	14 401.0	7 478.4	1 055.0	+421.4
1961—65	20 684	15 680.7	8 147.6	703.6	+502.8
1966—70	18 147[b]	17 088.0	8 904.6	559.4	+697.6
1971—73	18 147[b]	18 148.3	9 436.8	402.2	+504.1
1974—75[a]	18 844	19 030.0	9 895.5	329.1	+434.6
1976—80	19 733	20 978.5	10 905.2	949.8	+1 067.2
1981—83	19 847	21 922.3	11 408.3	606.8	+450.4

Notes: [a] On 1st January 1973 the new administrative division has been introduced, changing 4315 *gromadas* into 2365 *gminas*. Since 1st June 1975, 17 first-order territorial units were replaced by 49 new voivodships.
[b] area of voivodships in administrative division 1st January 1974.
[c] area of voivodships in administrative division 1st January 1961.
Source: Own calculations based on data from Demographic Yearbooks

Eastern, Nort-Western, South-Eastern, Eastern, and Western Region in 1978, 1981 and 1984. The highest out-migration flows occur in these areas. Regions with the highest out-migration rates are characterised by a considerable degree of regularity and stability of age schedules in time. The younger strata of the labour force (aged 18 to 30) prevail as shown by the peak in this part of the curve. One can observe substantial changes in the Warsaw and Katowice out-migration profiles between 1978 and 1984, i.e. the rapid increase or decrease in the out-migration index of the labour force. All the schedules are characterised by the high values of the index, determining the dependence of childern on

TABLE 3. Population structure by main age groups in Poland, 1950 — 1983

Year 31 Dec.	Population (,000)			
	total	0 — 14	15 — 64	65 and over
	depopulation rural areas			
1965	1 347.0	414.0	803.0	130.0
1970	5 697.8	1 619.7	3 556.8	521.3
1973	7 201.9	1 912.7	4 514.2	775.0
1975[a]	10 220.2	2 730.6	6 358.2	1 131.4
1980	10 892.4	2 864.0	6 741.1	1 287.4
1983	6 873.8	1 761.4	4 238.7	873.7
	remaining rural areas			
1950	15 792.0	4 943.7	9 993.7	854.6
1955	15 483.0	5 100.2	9 518.7	864.1
1960	15 394.2	5 491.7	8 938.6	963.9
1965	14 523.0	4 825.0	8 641.0	1 057.0
1970	9 876.1	3 012.4	5 958.7	905.0
1973	8 161.9	2 386.4	4 990.3	785.2
1975[a]	4 934.6	1 384.0	3 039.2	511.4
1980	3 864.0	1 042.1	2 388.9	432.8
1983	7 948.9	2 188.6	4 977.0	783.3
	cities			
1950	9 243.0	2 430.4	6 349.0	463.6
1955	12 067.0	3 505.2	7 905.2	656.6
1960	14 401.0	4 493.4	9 121.1	786.5
1965	15 680.7	4 414.7	10 254.0	1 012.0
1970	17 088.0	4 015.5	11 759.8	1 312.7
1973	18 148.3	3 919.9	12 717.2	1 511.2
1975[a]	19 030.0	4 049.4	13 318.8	1 661.8
1980	20 978.5	4 801.2	14 308.4	1 868.9
1983	21 922.3	5 292.6	14 802.9	1 826.8

Note: [a] cf. Table 2.
Source: Own calculations based on data from Demographic Yearbooks.

their parents. The third basic component of the schedule, referring to the older age groups of migrants, indicates the mobility of older people. The high indices of the outflows of the elderly migrants from these regions are attributable to health and family regions. This is particularly true with respect to females who come to large cities to join families living there.

In the case of out-migration from the Warsaw and Katowice regions, the high mobility in the oldest age groups can be interpreted as a return migration to the regions of origin. The magnitude of the out-migration from these regions has an important influence on the demographic structure of these regions, especially their depopulating areas. Migration is selective and involves mainly young, energetic people, while people with less initiative and low aspirations remain in the countryside. This is one of the reasons for the vicious circle of mutually disadvantageous conditions eventually causing a relative socio-economic regress in the depopulating regions.

The processes of the outflows from agriculture, already lasting many years, have

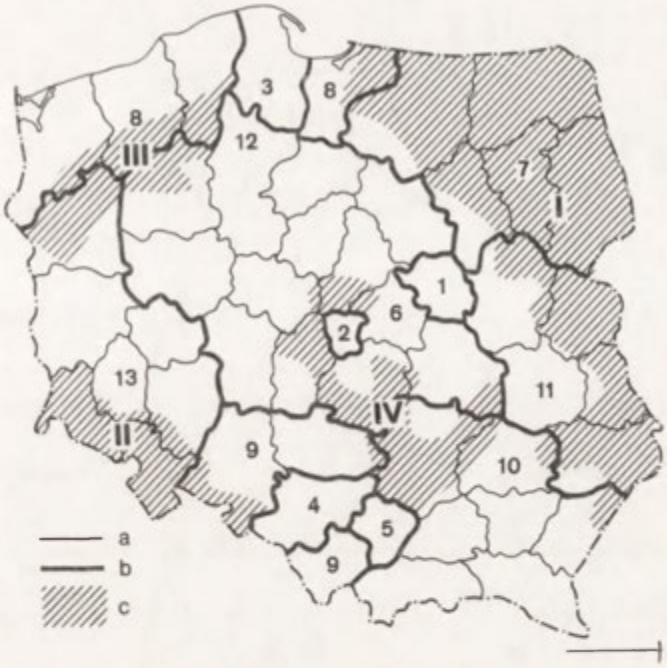

Fig. 4. The 13-region division and depopulating regions of Poland: a — limits of voivodships, b — limits of 13 regions and 8 macroregions, c — depopulating regions (I — IV) after P. Eberhardt
Sources: K. Dziewoński and P. Korcelli 1981; P. Eberhardt 1983, 1984

seriously affected the demographic structure of the depopulating regions. To exemplify the problem, two age categories have been selected, that between 20 and 29, and that over 60 (because young people between 20 and 29 particularly tend to take the decision to migrate, while the oldest group is characterised by more intensive processes of ageing). The number of young people (aged between 20 and 29) working in agriculture on over 30 per cent of the national territory, amounted in 1978 to merely 274 000. It is easier to interpret this when confronted with the remaining demographic properties of the investigated population and by following its disaggregation into separate regions. It emerges that a sound demographic structure and the relatively high percentage of a young labour force in agriculture is maintained only in the western and northern territories; in the remaining areas the share of the young labour force is low. A particularly distorted age structure was noted in the central and estern regions. The proportion of young people aged 20 — 29 there did not exceed 15 per cent, which, of course, brought in its trail, not only adverse demographic, but also socio-economic consequences.

The share of women in the rural depopulated areas is constantly decreasing: the number of women per 100 men dropped from 104 in 1965 to 99.9 in 1983. A similar process occurs in the remaining rural areas, while in towns there are 108 women per 100 men (in Warsaw there are 114 women per 100 men).

The situation is even more dramatic if one takes into consideration the index of the number of women in the age group of 15 — 49 years per 100 men of the same age. For the two most depopulated voivodships (Białystok and Łomża) this index amounted to 81, and for the remaining five voivodships it amounted to from 88 to 90, while for urban areas this index was 103.5.

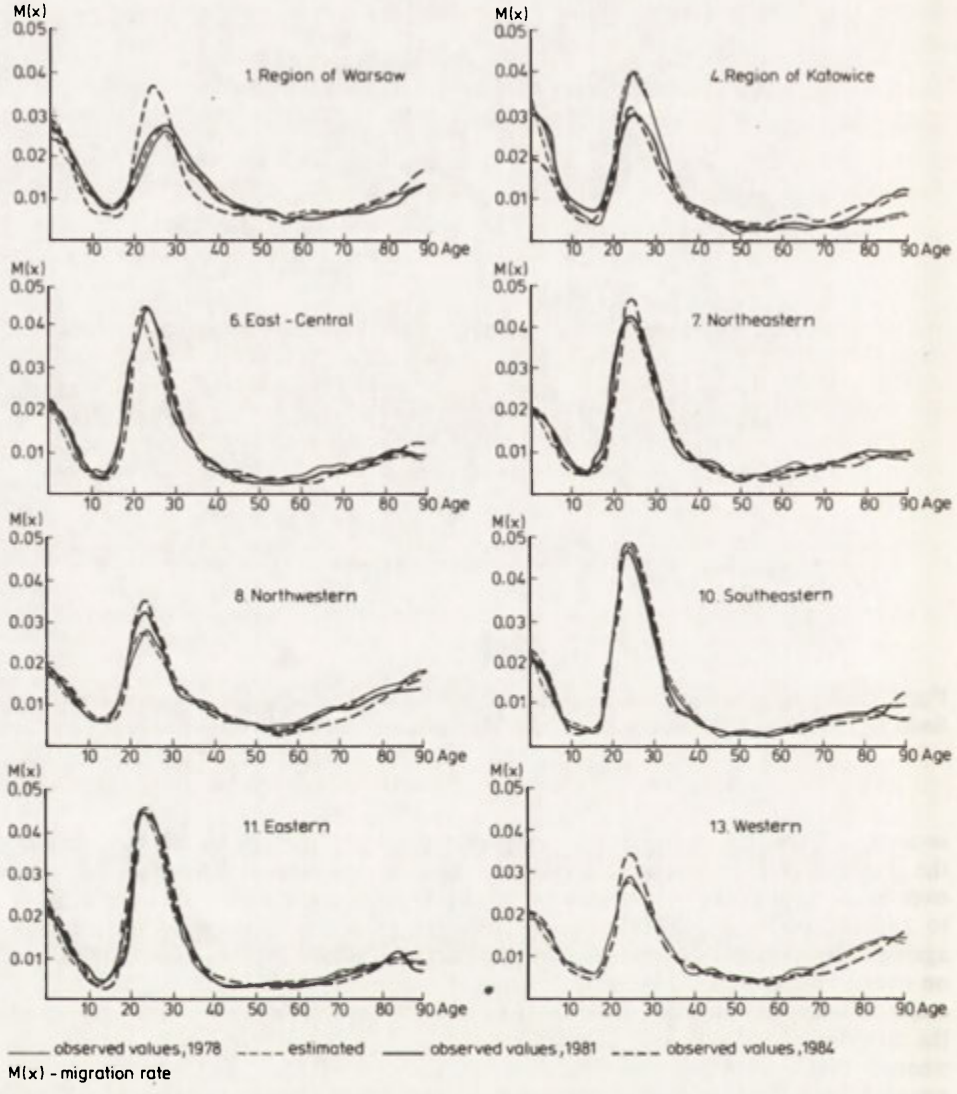

Fig. 5. Migration age patterns: out-migration from regions of: 1 — Warsaw, 4 — Katowice, 6 — East-Central, 7 — North-eastern, 8 — Northwestern, 10 — Southeastern, 11 — Eastern, 13 — Western. a — observed values, 1978, b — estimated values, 1978, c — observed values, 1981, d — observed values, 1984; M(x) — migration rate

Studies carried out in the late seventies in the Institute of Agricultural Economics indicate that "on average, about 17 per cent of the young managers of private holdings in Poland are single. This percentage in agricultural areas has increased to 30 per cent". This is a rather dangerous tendency, both from the social and the productive viewpoint, for many young men have left holdings for this very reason.

Another, equally negative, demographic tendency in depopulated areas is the acceleration of the ageing process of people. The dependency ratio with old people (the number of persons aged 65 or over per 100 persons aged 15 to 64 in depopulated areas)

increased from 16 in 1965 to almost 21 in 1983; in the remaining rural areas from 12 to 16, and in towns – from 10 to 12.

Simultaneously, the dependency rates of childern (the number of childern aged 0 to 14 per 100 inhabitants aged 15 to 64) in rural depopulated areas were lower than in the remaining rural areas and had decreased from 52 in 1965 to 42 in 1983.

The percentage of people aged over 60 working in agriculture may serve to ilustrate the process of ageing.

The same index, as regards other occupations, is slight. However, in private farming there is no formal age limit for retirement. Most people, both men and women, continue working at the age of over 60 years and are included in the statistics into "the economically active group". Out of the total agricultural labour force in the depopulating areas (1 519 800) as many as 264 000 were those of over 60 who continued to work in agriculture. Thus, every sixth person working in agriculture in the depopulating regions in 1978 was aged 60 or over. The discussed results are of great importance when one wishes to obtain a precise picture illustrating the actual resources of the labour force in agriculture in the differentiated regions, which can be assessed by deducting the number of people aged over 60 still working in agriculture. The economic value of the latter is not high since in reality they can be employed only in some subsidiary work. When this simplifying assumption is taken into consideration one can compute the average index, which amounts to under 20 workers per 100 ha of agricultural land, i.e. 5 ha of agricultural land per worker. Under the conditions of the modern mechanisation of agriculture, this index is very high. However, under the specific conditions of the investigated territories, characterised by a disadvantageous agrarian structure, an inadequate supply of agricultural machines und an underdeveloped infrastructure, such employement is ineffective and impedes the development of agriculture. Moreover, any further outflows of young labour, uncompensated by sufficient suplies of production means and by changes in the agrarian structure, may bring about the extensification of agriculture in the depopulating regions and an even lower productivity (Eberhardt 1985).

3. THE SOCIO-ECONOMIC SITUATION OF THE POLICY IN RURAL AREAS

The depopulation of rural areas in the period of the structural transformations of agriculture is a natural occurrence if there is a labour surplus and the remaining rural population ensures a high agricultural production, as well as services, and the demographic structure enables at least a simple demographic reproduction. The process of depopulation is then accompanied by an increase in the holdings size and their equipment, in means of production improving the production output, the socio-economic infrastucture must also accompany the develpoment of agriculture.

In Poland, this process was slightly different, i.e. it took place without the necessary substitutional investments in agriculture, which would have enabled the migration of labour force to urban areas without deteriorative effects on agricultural production. The insufficient development of substitutional investmens took place until 1965, when there were still labour force reserves in rural areas, as also later on when these reserves no longer existed (Fig. 6).

Apart from that, the policy towards private holdings has gradually changed. Initially the Decree of 1944 was proclaimed which ensured that "the agricultural policy in Poland will be based on holdings which are to be strong, healthy and ensuring an intensive production, and which would constitute the private property of their owners". After the land reform, when the new authorities strengthened their power, the policy changed and was directed at a quick transformation of Poland, originally into an agricultural-industrial and later only an industrial country. Industrialisation took place

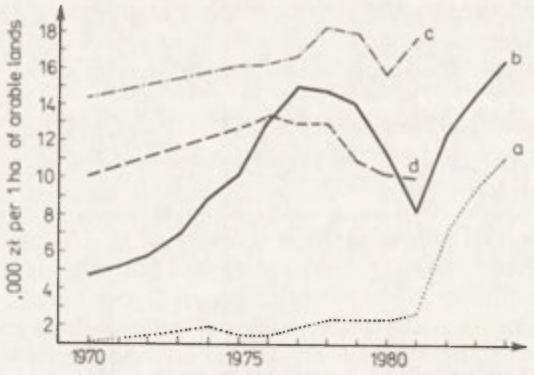

Fig. 6. Productive investments and net final production in private and socialised agriculture in Poland, 1970 — 1981. Productive investments (current prices) in private (a) and socialised agriculture (b). Net final production (fixed prices 1976/1977) in private (c) and socialised agriculture (d)

on the basis of means worked out by agriculture and thus there were "slight investments in the agricultural sector, low prices for agricultural goods, compulsory quotas in the private sector, considerably lower in the sector of co-operative farms" (*Rolnictwo polskie* ..., 1982).

In 1948, a decision was made to reconstruct agriculture through the socialisation of private holdings. The process of collectivisation was initiated by administrative and economic means: taxes were rigorously exacted credits were limited, as well as the supply of industrial products essential for rural areas, and by their distribution in which mainly the state owned and co-operative sectors were given priority.

On one hand, the labour force was taken from rural areas for industry and, on the other, no appropriate conditions were created for the develpoment and structural transformations of the private holdings.

Although the policy of collectivisation broke down in 1956, the authorities did not give up the socialisation of agriculture policy and the limiting of the develpoment of non-socialised agriculture, but this policy was still being implemented in a more discreet way, by using any opportunity to expand the socialised sector in agriculture (*Rolnictwo polskie...*, 1982).

In 1974, the health insurance project and pensions were applied to farmes as an equivalent for turning their farms over to the state (State Land Fund), which had an increasing area of arable lands. Simultaneously the sale of land from the State Land Fund to private owners had been severely curtailed; this was turned over to the socialised sector (Table 4).

"The changing agricultural policy caused moods of uncertainty concerning their future among private farmers, especially as the authorities constantly kept on repeating that the main target of the agricultural policy is the full socialisation of agriculture, and thus the liquidation of private holdings. And, interestingly, political leaders simultaneously stated that private agriculture produced at the lowest costs and, therefore, these holdings should be expanded and their production increased. This policy made successors reluctant to take over holdings and remain in the occupation of farmers" (*Rolnictwo polskie* ..., 1982).

The creation of agriculture based on strong large private family holdings, equipped with all the necessary means of agricultural production and independent of central

TABLE 4. Arable lands according to forms of ownerships in Poland, 1950 — 1985

Year June	Total	Socialised agriculture				Non-socialised (private) agriculture
		together	state farms	co-operative farms	agriculture circles	
			,000 ha			
1950	20 440.2	2 138.9	1 972.2	166.7	—	18 301.3
1955	20 402.8	4 634.9	2 759.9	1 875.0	—	15 767.9
1960	20 402.8	2 676.2	2 424.9	251.3	—	17 726.6
1965	19 636.9	2 993.7	2 660.4	211.8	121.5	16 643.2
1970	19 543.2	3 710.5	3 006.2	246.1	98.6	15 832.7
1975	19 208.7	4 029.7	3 291.7	323.9	233.0	15 179.0
1980	18 946.9	4 828.3	3 698.1	754.9	273.2	14 118.6
1985	18 844	4 419	3 531	695	75	14 425
			per cent			
1950	100.0	10.5	9.6	0.8	—	89.5
1955	100.0	22.7	13.5	9.2	—	77.3
1960	100.0	13.1	11.9	1.2	—	86.9
1965	100.0	15.2	13.5	1.1	0.6	84.8
1970	100.0	19.0	15.4	1.3	0.5	81.0
1975	100.0	21.0	17.1	1.7	1.2	79.0
1980	100.0	25.5	19.5	4.0	1.4	74.5
1985	100.0	23.5	18.7	3.7	0.4	76.5

planning, remained in contradiction with the policy, claiming the superiority of socialized agriculture, where decisions are made by the state and which is centrally planned and controlled.

The depopulation of rural areas without any parallel, even limited, transformations in the structure of non-socialised agriculture, failures in agricultural investments, the socio-economic infrastructure and services in rural areas, as well as the advancement of the ageing process in the rural areas, as a result of draining the agricultural labour market-were caused by the inappropriate agricultural policy.

The reasons for rural to urban migration directly felt in everyday life are, among others, the living conditions in rural areas. "There is running water in only 13% of the dwellings in these areas. One thrid of the farmers have to carry water to their holdings from elsewhere. Of the dwellings 40% are unfit for habitation. Almost 40 % of the rural inhabitants live in conditions far below the essential minimum (in towns — 10%). Twelve per cent of all rural families have a high living standard. In rural areas, 5 per cent of doctors, 14 per cent of the dentists, 5.5 per cent of the nurses, and slightly over 8 per cent of the obstetricians are employed, while the rural population constitutes almost 42 per cent of the national total. The average daily work of a woman in a rural area in the thirties has been estimated at ca 13 hours, in the sixties — at 14 hours, and currently at 15-18 hours, depending on the size of the holding, type of production and the family" (Haman 1982). It may be added that private holdings are worse equipped with such items as TV sets and washing machines; 20 per cent of the childern aged 3 to 6 can be accepted in kindergartens whereas for urban places this figure amounts to 45 per cent.

Since 1979 two migration phenomena can be observed. Firstly there is a rapid decline in the number of migrants (in the volume of migration) from rural to urban areas. Secondly, the negative net migration in also deepening. The following factors seem to be responsible for the declining attraction of urban areas:

— stagnating secondary sector an declining investment,
— serious crisis in the urban housing construction industry,
— food shortage (meat ration),
— increasing pollution in the urban environment (pollution rates in the main industrial centres are above any permissable norms).

The rural areas appear to be more resistant to the crisis. The increasing efficiency of agriculture positively affected the material standard of living of the rural people. Roughly the ratios of the average per capita annual income in a rural agricultural household and in an urban non-agricultural household were the following: in 1980 — 0.88, in 1981 — 1.01, in 1982 — 1.11, in 1983 — 0.99 and in 1984 — 0.96. Although these indices are perhaps overestimated because of the additional non-declared incomes in the urban households they do indicate, however, the equalisation of incomes between rural and urban areas.

The question of the relative backwardness and the difficult socio-economic conditions in the rural depopulated regions also appeared clearly in the light of results of the sociological research, conducted by W.Mirowski (1985) in the Biala Podlaska and Siedlce voivodships in the Eastern Region (see Fig. 4). Questionnaire inquiry enabled to grasp, in quantitative terms, a number of the interrelations among the migratory tendencies and social structure in the voivodships analysed, as well as the specific features of demographic and social structure in these and the non-depopulating areas. Lower shares of younger age-groups of productive population as well as a stronger defeminisation of younger age groups were established, which corroborates the results of the more general analyses. Besides, lower shares of the tertiary educated and shilightly higher shares of the secondary educated were observed, the facts which could not be established on the basis of statistical studies. Among the responedents from the depopulating areas, a greater percentage share of agricultural population, while in the non-depopulating areas a greater share of non-agricultural and mixed-income

population were observed in the study. This indicates that the possibllity of acquiring a non-agricultural job stabilized a rural population. Areas with a significant dominance of agriculture, with no non-agricultural jobs available to people, are less attractive and undergo depopulation to a greater extent.

Within the depopulating areas there are far fewer people coming from outside, meaning that inflows are quite weak there. Taking into account the fact that outflows of people from rural areas occur everywhere, the above observation gains importance in the shaping of net migration balances. In the farm magnitude structure within the depopulating areas, the share of larger farms is higher as is also the share of farms with a domination of poorer soils. Hence, it can be concluded that depopulating areas are to a greater extent those with an extensive, crop-oriented agricultural economy, in which the labour force demand diminishes as mechanisation progresses. Depopulating territories encompass more than an average share of the small villages, remote from towns and deprived of good transport and communication links with these towns. The - non-depopulated areas are, for the most part, better transport - and comunication-wise connected with towns and are displaying closer links with these towns. Urban areas also, therefore, play a stabilizing role in the rural demographic situation, as an important element of the properly functioning settlement system, providing contemporary inhabitans with opportunities for statisfying differentiated needs.

Through the analysis of interrelations between sex and attitude towards geographic mobility, it has been established that, for instance, women usually display a higher spatial mobility than men, a phenomenon which has not until now been given the attention adequate to its role in the demographic structures. There are no essential differences between men and women as to the evaluation of living conditions in urban and rural areas. Most respondents evaluate living conditions in urban areas as better. Simultaneously, however, most of them are rather content with living in rural areas, which indicates that there exists a cliche of a better life in towns, which does not necessarily indicate dissatisfaction with rural life. People living in rural areas often highly evaluate those aspects which do not influence the opinion on living conditions in the countryside but which do influence the level of their stability in rural environment (attachment to a village, customs, freedom, etc.).

Age is an essential variable differentiating attitudes with regard to living in rural areas. The youngest people are most frequently dissatisfied with rural life, and most frequently intend to migrate. A certain downward shift in stablization and the tendency to increase mobility can be also observed after 60 years of age, which is probably connected with the life changes occurring in this period caused by the diminishing economic activity, retirement, or transformations in the family life, leaving ones own home to live with childern and the like.

The educational level of a person is negatively correlated with his/her satisfaction with the rural life: the higher the educational level, the lower the satisfaction with life in the countryside. Simultaneously, there is a positive correlation between the educational level and migratory tendencies: the higher the educational level, the higher the intensity in the tendency to change the place of residence.

The membership of definite socio-occupational category is weakly correlated with evaluations of the rural life. White collar employes, however, display higher mobility propensities than the other categories, while farmers display the lowest mobility propensities. Evaluations of one's own living conditions tend to be reversed: white collar employees most often describe their standard of living as good, and farmers most often as bad. This amounts to the constatation that opinions on living standards do not have a decisive influence on migrations.

According to the opinions of the majority of people living in rural areas, the perspectives of rural life are not at present promising for the young. This dominance of negative evaluations of life perspectives for young people who choose to live in the

countryside is connected with the parents' orientation towards their childern's careers, mostly seen outside rural areas. There is, however, a differentiation as to the choice of preferences regarding the future residence location for male and female teenagers. The town and urban occupations are more frequently chosen for girls than for boys. Such attitudes have an undoubtedly significant influence on the greater intensity of outflow of young women from rural areas. A partial explanation of this pheomenon is provided by the more frequent wish to leave the farm to a male heir, but also by the fact that it is easier for a man to find a non-agricultural job in rural areas. This problem needs the paying of more attention to both the economic policies aiming at motivating young people to stay in the countryside and to the school-induced occupational pre--orientation shaping.

4. CONCLUSIONS

The fact that demographic recession and depopulation processes do concern only rural areas indicates that these phenomena have their well pronounced specificities. This was proven by the results of the studies, reported here, by demographic analyses as well as by special sociological studies, conducted within the depopulating areas. Demographic processes decrease in definite regions, encompassing a relatively large part of the national territory were going on during the continuous, relatively rapid demographic increase. This had to bring about important implications for population distribution in the country in the direction of growing disparities and differences between the areas with increasing spatial concentration of people and those with decreasing population densities. Results of these processes are glaring. Just after the Second World War, the territories nowadays undergoing depopulation accounted for some 20 per cent of the national population, this share now being at mere 10 per cent. These structural changes are not only related to the large-scale population movement, but also to trends in concentration and spatial polarization in spatial population distribution. During the years, the quantitative changes turned into qualitative ones. Consequently, there ensued transformation in spatial population distribution and decrease or an increase in demographic rank of certain areas within the spatial structure of the country. These phenomena slowed down recently because of the economic crisis, whose direct effects were: diminished intensity of migratory flows and birth rate increase in the period 1982 — 1984.

As based on these remarks, problems can be formulated concerning future studies of depopulation processes in rural areas of Poland. Attention should be paid to studies of the most recent trends in population dynamics and area types both on the national and sub-national scale.

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MIGRATIONS AMONG POLISH URBAN AGGLOMERATIONS

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THE PROBLEM

It is widely accepted in the literature that urban agglomerations play an important part in the national settlement system. The question, however, arises whether they shoud be considered in terms of a common sub-system within the national settlement system or as comprised within their individual regional settlement systems. Beginning with the morphology of the agglomerations, especially from their observed sectoral develpoment, as following bands of the transportation and communication infrastructure, it was concluded that the development was related to the placement of neighbouring agglomerations. On this basis the conclusion was arrived at that the agglomerations must be strongly interrelated. Further on, a hypothesis was put forward that agglomerations form an integrated sub-system within the national settlement system (Korcelli 1976). A test of whether or not urban agglomerations should be considered in terms of common sub-system ought, however, to be supported by an investigation of whether their inter-relationships are more important than the relationships of each of them with its umland. The answer to this question would allow us to conclude whether changes in the Polish settlement system aim at the develpoment of a single super-agglomeration, as Leszczycki (1973) maintains, or of a system of urban regions with agglomerations as the centres of some of them, as Dziewoński (1972, 1973) agrues. An analysis of the Polish regional structure indicated that agglomerations are entities of a regional rather than national scale; this permitted the hypothesis that the relationships between individual agglomerations and their regions are stronger than those between the agglomerations are (Rykiel 1978). To test this hypothesis, vectoral data should be used which would allow the distinguishing of the relationships within the hypothetic sub-system of agglomerations, those between individual agglomerations and their respective regions, and those with the rest of Poland.

IDENTIFICATION OF AREAL UNITS

Nine Polish urban agglomerations were identified for this analysis (Warsaw, Cracow, Łódź, Wrocław, Poznań, Gdańsk, Szczecin. Katowice, and Bydgoszcz), i.e. those which had been indentified as developed agglomerations in the National Plan of Physical Development till 1990 (*Plan...* 1974). The developing agglomerations, as identified in the Plan are argued here as belonging to the future rather than the contemporary settlement system and are thus not analysed herein. The same applies to the potential agglomerations, as indentified in the Plan, which must have been based on rather unclear criteria of indentification. Seven free-standing cities were taken as cores

of the agglomerations while in the cases of the Katowice and Gdańsk, complexes comprising 13 and 3 towns, respectively, were identified. The outer rings of the 9 agglomerations were delimited *ad hoc* with towns and communes taken as basic areal units. The proposed delimitation (Fig. 1) differs in details from those provided in finer approaches (Iwanicka—Lyra 1969; Gontarski 1980), and, like any other, could be criticised as arbitrary. In doing this it must be kept in mind, however, that it was not delimitation that was the scope of the analysis; rather, the delimitation was but a means which made it posible to measure the spatial scale of the interactions of the agglomerations involved.

Fig. 1. Polish urban agglomerations and their regions, 1978: A — agglomerations, B — urban regions, C — provincial boundaries

As the first approach to the delimitation of regions of the nine centres, i.e. the cores of the agglomerations, commuting sheds of the centres were taken, as based on the 1973 data with modifications concerning changes in basic areal units up to 1978. The commuting sheds of each of the centre analysed comprised spatially contiguous basic units with 10 or more out-commuters to the city. In cases of overlapping sheds they were separated on the basis of the prevalent interaction. However, any regional delimitation should be based not so much on the range of influence of the regional centre in an open space but rather in the space which is relatively closed by influence propagated from competitive regional centres. Region is therefore said to be identified on the basis of the relative closeness of relationships which are acknowledgec to be characteristic of it (Dziewoński 1967). The influence of the 30 competitive regional centres, the figure being identified on the empirical ground (Rykiel and Żurkowa 1981),

should be therefore taken into account so as to define the urban regions of the nine analysed agglomeration cores. Firstly, from the commuting sheds of the agglomeration cores those areas which were more strongly related to any of the 30 regional centres should be excluded. Secondly, areas being situated beyond the 39 commuting sheds (i.e. those of both the agglomeration cores and regional centres) were included into the urban regions on the basis of their migratory gravitation. In this way, 39 Polish urban regions were identified of which, however, only nine are of interest for further analysis (Fig. 1). These somewhat differ from the 47 regions identified by P. Korcelli, A. Potrykowska and D. Bodzak (1981) which did not exhaust the national territory.

The relationships between urban agglomerations in the national settlement system were analysed as based on migration. The latter was defined as the crossing of the administrative boundary of communal and/or municipal level. The 1978 data were utilized.

AN ANALYSIS OF RELATIONSHIPS

Out of the relationships of urban agglomerations within the national settlement system, it is only an 1/8 that is accounted for those with other agglomerations, and 1/3 by those of the agglomerations with their respective regions, and over a 1/2 with the rest of Poland (the other 38 regions but 8 agglomerations). The share of the hypothetic subsystem of agglomerations in the turnover of individual agglomerations is rather similar (Table 1). On the contrary, the shares of intra-regional relationships are more differentiated, with an especially small proportion in the cases of the Katowice and Szczecin agglomerations; even there, however, they are responsible for a proportion roughly twice as large as that accounted for by the relationships with other agglomerations. The strongest relationships of agglomerations apply, however, to the rest of Poland; they comprise 2/3 of the relationships of the Szczecin agglomeration and nearly 3/4 of the Katowice agglomeration; it is only in the case of Cracow that they are as equally important as the intra-regional relationships.

TABLE 1. Spatial pattern of the migratory relationships of Polish urban agglomerations, 1978, total

Agglomerations	Relationships with (%)		
	other agglomerations	own region	rest of Poland
Warsaw	12.1	41.2	46.7
Łódź	12.9	41.1	46.0
Cracow	14.6	42.7	42.7
Wrocław	10.3	35.1	44.6
Poznań	10.5	43.7	45.8
Gdańsk	12.0	31.6	57.0
Szczecin	14.3	22.5	63.2
Bydgoszcz	12.3	34.1	53.6
Katowice	9.4	19.1	71.5
9 agglomerations	12.2	31.9	55.9

The generalized pattern pointed to above varies for the different categories of migrants analysed. In this paper migrants of the four educational categories existing in the Polish educational system were analysed, viz. primary, post-primary skilled, secondary, and tertiary. When flows of the primary educated are concerned, the importance of the system of agglomerations drops to 1/13, and it is only in the cases of the Cracow and Szczecin agglomerations that it exceeds 1/10. In general, the share of intra-regional relationships slightly increases, but in the cases of the Szczecin and Katowice agglomerations this decreases. It is to this spatial scale that the majority of relationships fall in the Cracow, Łódź and Warsaw agglomerations, as well as of Poznań for which it creates an absolute majority (Table 2).

TABLE 2. Spatial pattern of the migratory relationships of Polish urban agglomerations, 1978, the primary educated

Agglomerations	Relationships with (%)		
	other agglomerations	own region	rest of Poland
Warsaw	7.2	48.9	43.9
Łódź	7.3	48.6	44.1
Cracow	10.6	47.4	42.0
Wrocław	7.8	36.5	55.7
Poznań	6.7	50.4	42.9
Gdańsk	7.6	36.1	56.3
Szczecin	10.4	21.3	68.3
Bydgoszcz	8.1	39.5	52.4
Katowice	6.3	18.5	75.2
9 agglomerations	7.6	36.7	55.7

TABLE 3. Spatial pattern of the migratory relationships of Polish urban agglomerations, 1978, the post-primary educated skilled

Agglomerations	Relationships with (%)		
	other agglomerations	own region	reset of Poland
Warsaw	7.6	50.9	41.5
Łódź	9.9	43.9	46.2
Cracow	10.2	53.3	36.5
Wrocław	7.3	41.7	51.0
Poznań	7.0	54.4	38.6
Gdańsk	8.9	33.6	57.5
Szczecin	10.2	25.2	64.6
Bydgoszcz	8.5	43.7	47.8
Katowice	6.7	17.9	75.4
9 agglomerations	8.1	36.4	55.5

As far as the post-primary educated skilled persons are concerned, the share of relationships between agglomerations increases to 1/12 while in the cases of the Cracow and Szczecin agglomerations the higher proportion maintains (Table 3). In the cases of the Poznań, Cracow and Warsaw agglomerations it is by the respective regions that an absolute majority of migration is accounted for; in the case of the other agglomerations it is the rest of Poland that accounts for the majority, although it is a relative majority in the cases of the Bydgoszcz and Łódź agglomerations.

As regards the secondary educated, the migration share between agglomerations increases to 1/8 but decreases to 1/20 in the case of Łódź. The share of intra-regional relationships decreases so that it does not exceed 2/5 of the total, Łódź being the only

TABLE 4. Spatial pattern of the migratory relationships of Polish urban agglomerations, 1978, the secondary educated

Agglomerations	Relationships with (%)		
	other agglomerations	own region	rest of Poland
Warsaw	14.0	37.0	49.0
Łódź	5.1	40.6	54.3
Cracow	14.5	38.3	47.2
Wroclaw	12.0	31.3	56.7
Poznań	12.5	37.4	50.1
Gdańsk	15.2	23.6	61.2
Szczecin	16.9	21.8	61.3
Bydgoszcz	15.4	25.8	58.8
Katowice	12.4	19.0	68.6
9 agglomerations	11.9	27.5	60.6

TABLE 5. Spatial pattern of the migratory relationships of Polish urban agglomerations, 1978, the tertiary educated

Agglomerations	Relationships with (%)		
	other agglomerations	own region	rest of Poland
Warsaw	16.5	34.1	49.4
Łódź	17.0	35.7	47.3
Cracow	19.2	37.7	43.1
Wroclaw	12.3	33.7	54.0
Poznań	13.4	39.4	47.2
Gdańsk	14.8	33.6	51.6
Szczecin	18.2	22.7	59.1
Bydgoszcz	15.9	28.2	55.9
Katowice	7.0	12.2	80.8
9 agglomerations	18.5	29.4	52.1

exception, but in any single agglomeration it is considerably higher than that of the migration between agglomerations. What prevails in this category of migrants is their relationships with the rest of Poland which in the Warsaw and Cracow cases only do not reach 1/2 of the interactions (Table 4).

When the tertiary educated are concerned (Table 5) the share of relationships between agglomerations increases to 1/6, but in the Katowice case it drops to 1/14. It is for this category of migrants that relationships between agglomerations play a relatively most important part, although in no single case do they comprise 1/5 of the respective total. Intra-regional links are more important, yet it is the relationships with the rest of Poland that predominate; in the case of the Katowice agglomeration they account for over 4/5 of migrations.

CONLCUSIONS

This analysis has indicated that in the migratory relationships of urban agglomerations a dominant part is played by extra-regional links directed to areas outside the nine agglomerations. The second position is held by intra-regional links while the inter-relationships of the agglomerations occupy the third place. The role of flows between agglomerations increases, in general terms, when the educational level of the migrants involved is higher, although individual agglomerations possess regularities of their own, e.g. exceptionally small role of flows between agglomerations for the tertiary educated in the Katowice case, and for the secondary educated in the Łódź case.

In Table 6, categories of migrants were shown as the most characteristic of the individual spatial scales of the interactions of the agglomerations. Of migration between agglomerations, the tertiary and secondary educated are characteristic; of the flows between agglomerations and their respective regions — the post-primary skilled and primary educated; of those between agglomerations and the rest of Poland — the

TABLE 6. The categories of migrants, as defined by the educational level prevailing in individual spatial scales of the migratory relationships of Polish urban agglomerations, 1978

Agglomerations	Relationships with (%)		
	other agglomerations	own region	rest of Poland
Warsaw	3	1a	3, 2
Łódź	3	1	2
Cracow	3	1a	2
Wrocław	3, 2	1a	2
Poznań	3	1a	2
Gdańsk	2	1	2
Szczecin	3	1a	1
Bydgoszcz	3, 2	1a	2
Katowice	2	1	3
9 agglomerations	3	1, 1a	2

1 — the primary educated; 1a — the post-primary educated skilled;
2 — the secondary educated; 3 — the tertiary educated

secondary and tertiary educated. Generally therefore, in intra-regional migration the lower educated prevail, whereas in extra-regional migration - the higher educated. Of individual agglomerations, however, distinctive particularities are characteristic in this respect. This, and even more the fact that inter-relationships of agglomerations account for a slight proportion of migration concerning the agglomerations, imply that urban agglomerations could hardly be said to form an integrated sub-system within the national settlement system; rather, they are strongly regionally rooted, it can, therefore, be argued they are comprised in their respective regional settlement systems. In addition, the considerable share of their relationships with the rest of Poland implies their considerable integration with the national system as a whole.

The results of the analysis have significant implications for planning. Planning on the scale of agglomerations, although desirable, would seem inadequate; what seems essential is to relate this scale of planning with that on the regional scale. This is particularly important in the case of the planning of social infrastructure and the capacity of respective networks, which should be balanced with the demand on the regional scale rather than merely with those within agglomeration.

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MIGRATION AS A FACTOR DIFFERENTIATING DEMOGRAPHIC STRUCTURE OF POLISH TOWNS

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Studies of the demographic differentiation of the Polish urban system demonstrated (Pytel-Tafel 1984) that migration has been the factor which contributes most to such a differentiation.

The aims of the studies on demographic structures in towns were to present a generalized picture of the demographic differentiations in all of the Polish towns, to explain the causes of some demographic phenomena, as well as to empirically confirm the existence of the processes known from theory. The study encompassed the set of the 803 Polish boroughs which existed in 1977.

Geography involves a number of classes of spaces, among which socio-economic spaces form a distinct group. According to K. Dziewoński (1967), general socio-economic space is a totality composed of partial spaces. This space contains various elements, subsets and interrelations. In the analyses of demographic space, being a subset of the general socio-economic space, three partial spaces were *a priori* distinguished, referred to further on as subspaces: the demographic, the socio-occupational and the migratory space. These subspaces constitute segments of reality; they are interdependent, but not identical. Each of them was defined by a set of possibly homogeneous diagnostic features — variables. In order to determine the main dimensions of the subspaces distinguished, three detailed principal component analyses had been performed, and thereafter a joint analysis was carried out for the set of all the 47 variables (see Table 1) in order to provide for a comparability of the partial and summary results.

1. DEMOGRAPHIC SUBSPACE

The analysis of demographic subspace concerned the whole urban population. This analysis was based upon strictly demographic variables, i.e. age, sex and natural increase. As a result, 7 components were obtained, which together accounted for 80 % of the total variance, out of which almost 50% was accounted for by the initial 3 components. These components received most attention when interpreting the results.

First component, C_1^1, which, after rotation, accounted for 17.9% of the total variance, was called *the effect of post-war migration.* The component pattern represents the three-fold spatial structure (Fig. 1) which still reflects the basic consequences of post-war boundary changes and resettlement processes. The most pronounced are the

TABLE 1. Input variables and component matrix after rotation*

No.	Name of variable	C_1	C_2	C_3
	Demographic subspace			
1	percentage of population aged 0 — 14		−0.82 (68%)	
2	percentage of population aged 15 — 29	0.89 (80%)		
3	percentage of men aged 15 — 29			0.83 (70%)
4	percentage of population aged 30 — 44			
5	percentage of men aged 30 — 44			0.68 (47%)
6	percentage of population aged 45 — 59		0.91 (83%)	
7	percentage of men aged 45 — 59		−0.51 (27%)	
8	percentage of population aged 60 or over	−0.89 (80%)		
9	percentage of men aged 60 or over	0.71 (51%)		
10	marriages per 1000		0.53 (29%)	
11	births per 1000			
12	deaths per 1000			
13	number of women per 100 men			0.72 (53%)
14	net natural increase of men			
	Socio-occupational subspace			
15	percentage of employed in industry	−0.71 (50%)		
16	percentage of employed in construction			
17	percentage of employed in transport and comunication			
18	percentage of employed in trade			−0.65 (44%)
19	percentage of employed in science, education and culture			
20	percentage of employed in administation, judicial system, finances and insurance	0.55 (30%)		−0.60 (36%)
21	percentage of employed in other services	0.68 (46%)		
22	percentage of employed aged 17 —24		0.64(41%)	
23	percentage of employed of highest occupational capacity (25 — 39 years of age)		0.49 (24%)	
24	percentage of employed women aged 18 — 44		0.84 (71%)	
25	percentage of employed women in the retirement age			
26	percentage of employed men in the retirement age			

27	women's economic activity rate per 1000 female inhabitants			0.83 (71%)
28	men's economic activity rate per 1000 male inhabitants			0.74 (56%)
29	employment in private crafts per 1000 inhabitants			
30	employement in non-industrial crafts in per cent of that for all crafts			
31	blue collar employment	−0.86 (74%)		
32	percentage of the tertiary educated employed in socialized sector	0.48 (23%)		
33	percentage of employment in socialized sector with college and secondary vocational training	0.77 (59%)		
34	percentage of employed in socialized sector with post-primary vocational training	−0.55 (31%)	0.59 (35%)	
35	percentage of employed in socialized sector with incomplete primary education		−0.74 (56%)	
	Migratory subspace			
36	population density per 1 ha			0.53 (29%)
37	total in-migration per 1000 inhabitants		0.96 (93%)	
38	percentage of male in-migrants			
39	percentage of in-migrants from the same voivodship	0.45 (20%)		
40	percentage of rural in-migrants	0.83 (71%)		
41	percentage of economically active in-migrants			
42	total out-migration per 1000 inhabitants			−0.84 (72%)
43	percentage of male out-migrants			
44	percentage of out-migrants to the same voivodship			
45	percentage of rural out-migrants	0.80 (64%)		
46	percentage of economicaly active out-migrants			
47	coefficient of the effectiveness of migration		0.77 (59%)	0.47 (22%)

*Numbers in brackets denote percentage of variance accounted for by variables whose correlation coefficients with a component $|r| > 0.45$.

differences in population structures of the towns of the pre-war territories on the one hand, and those of the Western and Northern territories on the other. The National Census of 1950 states that migration related to the re-polonisation of the re-gained territories encompassed some 2 916 000 persons coming from within the present boundaries of Poland and 1 750 000 in-migrants from outside, mostly from the former Polish eastern territories. This poulation which then settled in the re-gained territories had all the features typical for inflow areas, i.e. it was younger than the persons migrating to other areas of Poland, was characterized by a numerical domination of males and by a high share of unmarried people (Gawryszewski 1977). At the end of the 1970s the Western and Northern territories had a high percentage of young people and a significant share of men in older age groups, with a much smaller — as compared to the towns located in other parts of the country — share of the oldest age group. The very high scores of the first component reflect structures of this type.

A diametrically different age structure is characteristic of the central regions, where the oldest age group in towns has the relatively highest share, with a strong numerical domination of females within this age group; simultanoeusly, the share of population aged 15–19 is lower.

Finally, the thrid zone, where the average component scores are mixed with the positive scores, encompasses a rather homogeneous area of eastern and south-eastern Poland, as well as the towns of the Piła, Bydgoszcz, Gdańsk and Opole voivodships. It seems that a dominating influence on such a pattern of the age srtucture of the urban population in eastern Poland was exerted by both the immediately post-war and by present migrations. This area was traditionally an out-migration territory, which until very recently has had high demographic dynamics, where the constant outflows resulting from migration have been compensated by a high natural increase, especially in rural areas. At present, however, a disadvantageous age and sex structure is starting to shape this territory, weighing upon its demographic future (Mirowski 1985). A further out-migration of young people from these areas may lead to depopulation (Eberhardt 1987).

Other factors shaped the age and sex structure in towns of the Opole voivodship into which far fewer settlers came after the war than to other areas of the Western territories, whille the basic population group there constituted its original inhabitants, with a significant numerical domination of females (Jelonek 1958).

An explanation for the age structure in individual towns should be sought both in the procreational attitudes of the present and previous generations and in the propensity for migration on the local population, for the structure is shaped by both natural increase and by migration.

The pattern which emerged 40 years ago as a result of migration turned out to be extremely stable and it still most effectively differentiates the demographic subspace of the set of Polish towns. It is only upon this pattern that the processes of industrialisation and urbanisation, developing over that period on a great scale, should be superimposed.

The second component, $C_2^!$, which accounts for 16.5% of the total variance, was called *demographic implications of industrialisation.* Although the analysis performed applies to one year, the variables introduced, numerically describing individual age groups, contain in a way time, which is reflected by in this component. Owing to the specific age and sex structure the processes from individual periods of the post-war industrialisation of Poland were reflected. Identification of these changes, closley related to urbanisation, bacame possible only after limiting the analysis to urban population.

The second component is dychotomic. Low component scores relate to demographically active towns, with very high shares of children in the total population and significant numbers of older males aged 45 to 59. Those towns underwent intensive investment in the late 160s and in the 1970s (e.g. Lublin/Głogów Copper Mining Basin, Rybnik Coal District). Simultaneously, a young population entering the procreative age,

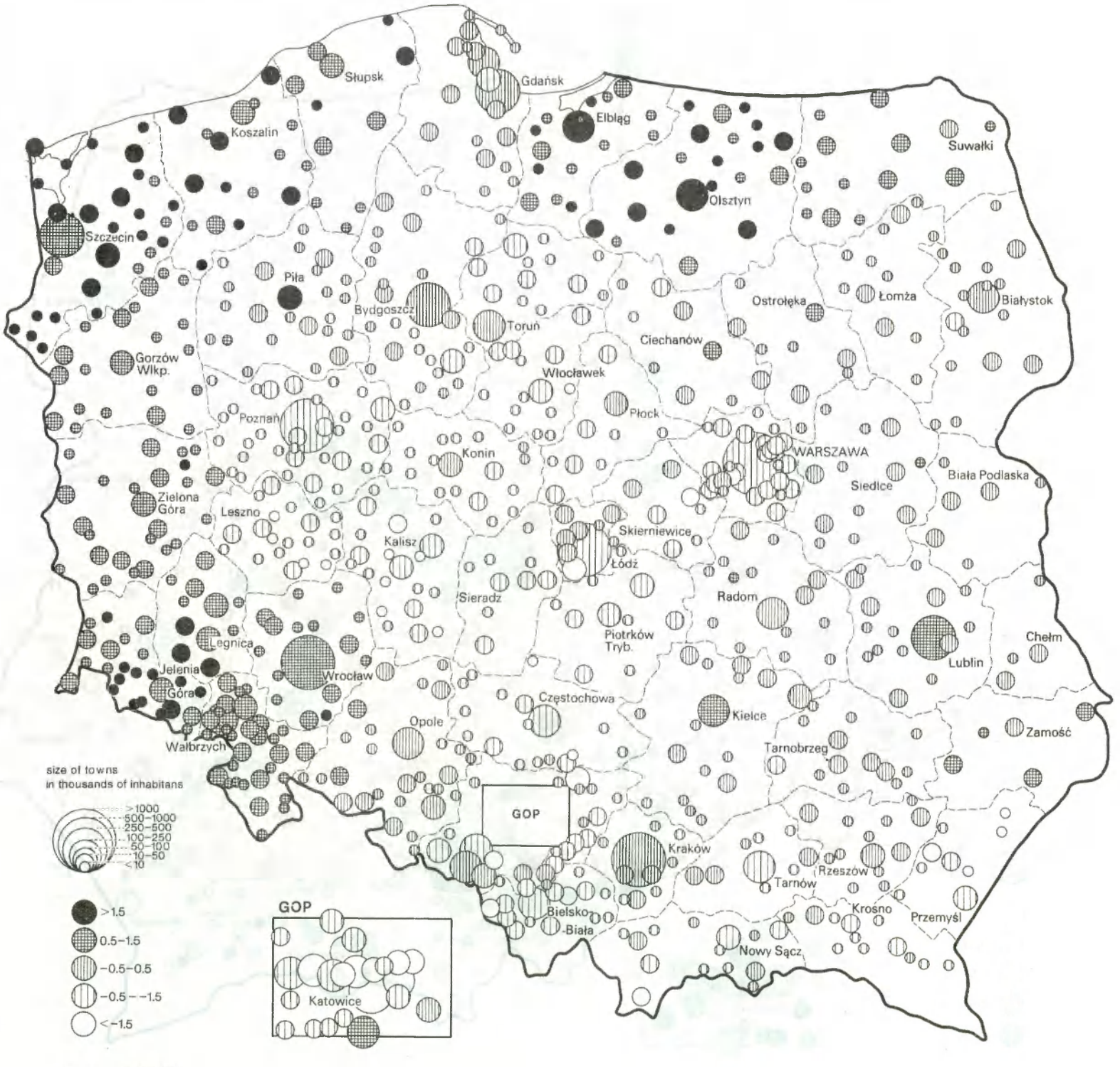

Fig. 1. Demographic analysis, component scores for C_1' — the effect of post-war migration

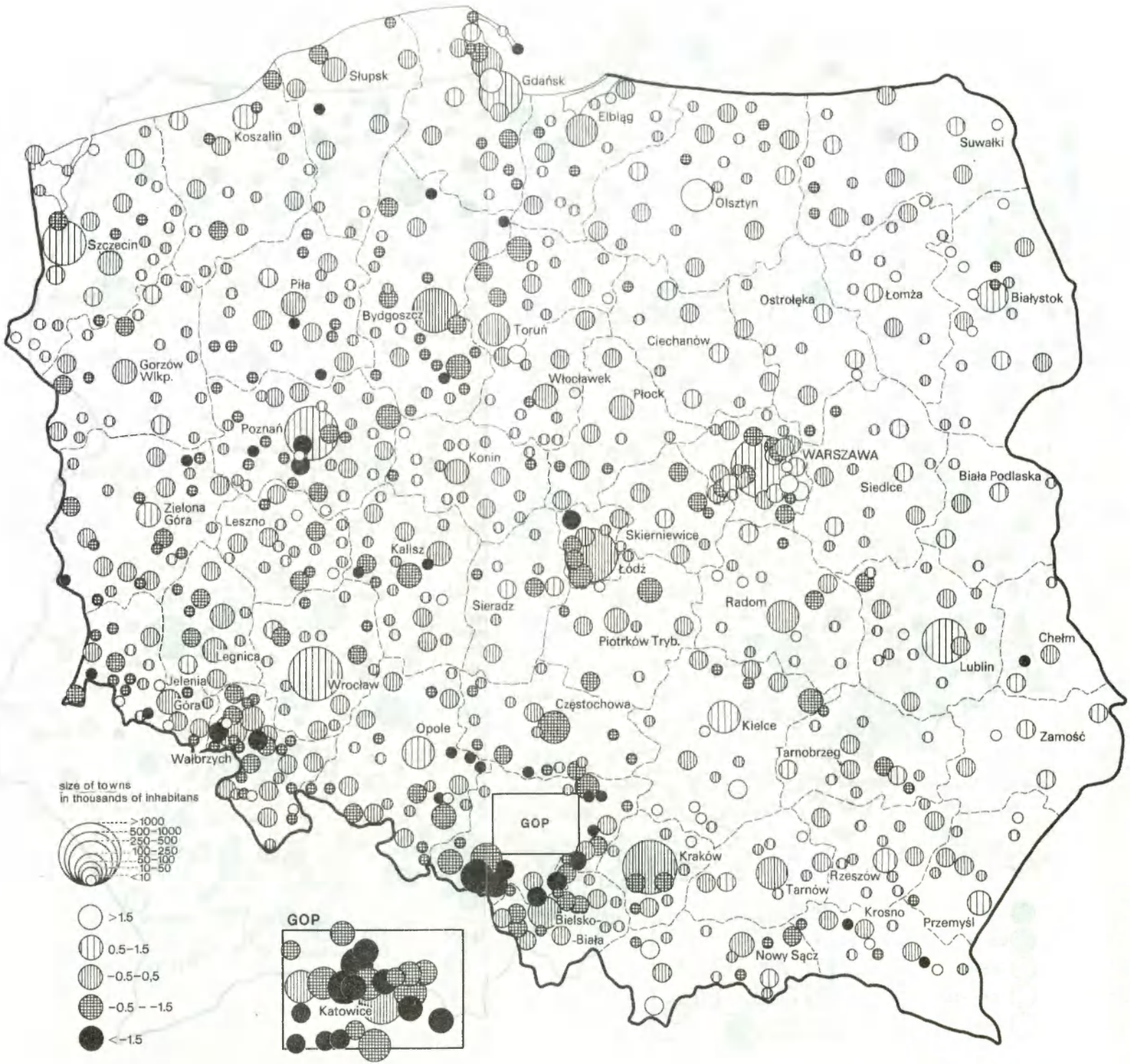

Fig. 2. Socio-occupational analysis, component scores for C_1^{II} — the dominant function and social structure

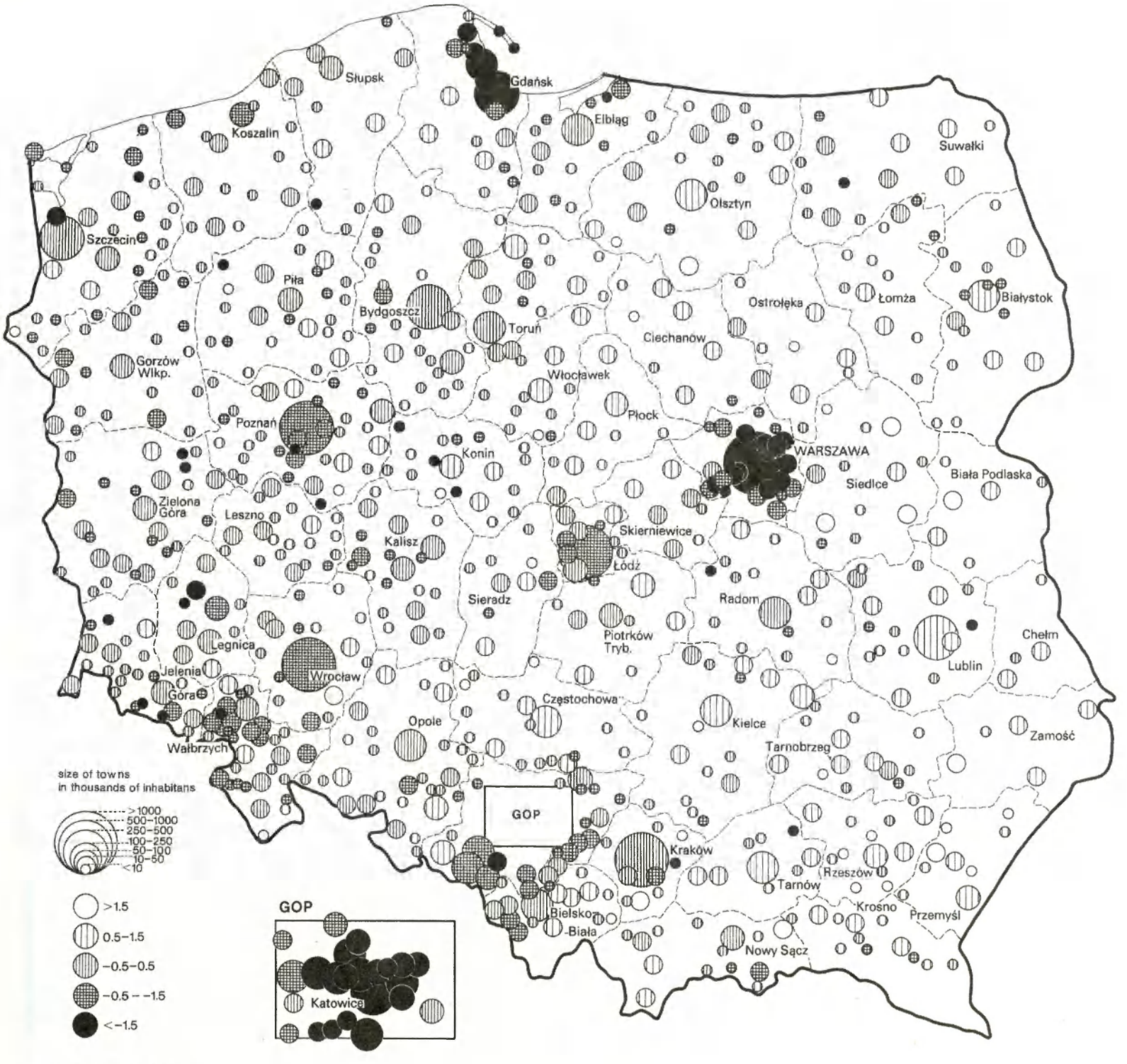

Fig. 3. Analysis of migrations, component scores for C_1 — the dominating direction of urban migration

dominates in towns located in the territories undergoing rapid urbanisation (eastern part of the country).

Opposite to that type are demographically stable towns (with high component scores), with high shares of older population (between 45 and 59 years of age) and simultaneously higher than elsewhere numbers of marriages. Such a demographic structure is characteristic of the largest urban agglomerations and large towns, as well as for old industrial centres, long urbanised. According to the scale of the second component, the Katowice conurbation and the Sudetes Mts towns represent a homogeneous population structure. This results, however, from different causses. From the piedmont towns, because of the decapitalisation of the local industry, the young population, born there after the war, out-migrates in search of better jobs conditions. On the other hand, the large towns and industrial districts, reconstructed and further developed in the early 1950s (including the Katowice conurbation), then attracted younger population (aged 20 — 30) and never afterwards attracted the similarly numerous single age group. Structures thus created are extraordinarily stable because they are maintained by an even more numerous generation of childern. With time, therefore, specific, two-generation age structures emerge, which include parents and their childern. Two such demographical groups have basically been developed in Polish towns. One encompasses the generation of the youngest children and their young parents, and the second — the baby boom generation and their young parents. Other age groups more rarely appear together.

The third component C_3^I, which accounts for 14.3% of the total variance was named *sex structure*. The high component scores indicate the dominating role of young males (especially those aged 15 to 44) in the respective urban population, i.e. the most economically active group. The low component scores indicate an absolute majority of females.

The balance or imbalance of proportions of sexes results from two factors: population age (women live longer) and the natural increase (more boys are born). On the other hand, the spatial differentiation of this phenomenon is shaped by migration which transform in a way the natural age structure in a given town.

Among the rural to urban migrants females prevail, as opposite to the pattern of the 1950s. The main cause of the female outflow from rural areas is the harder living conditions there and the significantly limited job opportunities outside agriculture. These conditions are expected to improve by migration to a town. If there is no attractive industrial centre in the vicinity, females, more often than males, migrate to the nearest town, even if small, and more rarely undertake migrations further afield. That is why women dominate in numbers in the small towns of lower industrialised and urbanised eastern Poland.

Males, on the contrary, migrate towards more attractive labour markets. They tend, therefore, to migrate towards the new and old industrial districts (with a domination of heavy and mining industries), where they usually find employment initially in construction, and then in industry. To more important areas with a numerical domination of males the large post-war investment areas may be, therefore, included, e.g. the Katowice conurbation, the Rybnik Coal District, the Lubin/Głogów Copper Mining Basin, and also the port complexes of Gdańsk/Gdynia and Szczecin. Of other large towns a balance of sexes or a domination of females is characteristic since a highly developed tertiary sector and light industry attract also a large number of females.

The certain numerical domination of males in the western territories, as compared to the pre-war territories, is related to the character of the post-war migration (see C_1^I). The pattern developed at that time is being slowly transformed because of the large share of young people, among whom the proportions between the sexes are balanced.

A component must not necessarily be interpreted in a descriptive way, i.e. in terms of variables which load on this component. If the cause underlying the covariance of

several variables, which together load on a component, is identified, this cause or process may provide the name for the component. It can, therefore, be stated that differences in urban demographic structure in the late 1970s were mainly due to: (1) the physical development of the western and northern territories, (2) location of the most recent investments and vigorous, growing industrial centres, in opposition to old urban centres, and (3) differentiation of directions and destinations of migration.

2. SOCIO-OCCUPATIONAL SUBSPACE

The second analysis encompassed only people working in the urban socialised sector and, partly, in private crafts. This analysis was defined by the set of variables related to age, educational level, type of occupation and employment structure. The socio--occupational space is most strongly differentiated by the three initial components.

C_1^{II} — *dominant function and social structure* (Fig. 2). This component expresses in quantitative terms the relation between the type of economic base, on the one hand, and social status and the educational level of the employees, on the other. The type of the dominant function (Dziewoński 1971), i.e. the one which underlie the urban development by determining the demand for individual occupational categories, basically defines the level and the direction of education. This, in the case of a signifcant domination of industrial function leads to the emergence of a homogeneous, working-class urban structure (e.g. the Katowice region). From the social and political point of view the emergence of towns relatively homogeneous socially is rather disadvantageous, this is clearly opposed to the process of the levelling of social territorial differentiation.

C_2^{II} — *age structure and education level.* The professional skills of people employed in a given town depend first of all upon the age structure of employees (in younger age groups the formal educational level is higher), and somewhat less upon historical traditions. Of the employees in the post-Russian towns or those re-polonised after the war a relatively high share of employees with an incompleted primary education is characteristic (e.g. the Sudetes Mts towns, the Łódź and Warsaw agglomeration).

The lack of balance between the general level of economic activity and the level of employment in the tertiary sector is reflected in component C_3^{II} called *work function and service level.* An increase in economic activity, i.e. an increase in workplace function (Jerczyński 1977), is connected with the development of functional specialization, mainly, however, in productive activities. Hence, service supply in these centres is lower than in the service centres of comparable size (Jerczyński 1978). Only when the dynamics of development of tertiary functions, could the Polish urban economy enter a new phase.

The differentiation of the socio-occupational urban subspace is decisively shaped by the nature of the economic base, age structure of inhabitants, historical conditioning and the attained level of fixed assets. All these factors stimulate the development of an urban dominating function exerting an influence on both the level and the direction of education and on the economic activity rate.

3. MIGRATORY SUBSPACE

The third analysis performed concerned merely migrants, i.e. the people who came to or left a town. The structure of migrants, was studied according to directorial categories (i.e. migrations from and to towns) and, within each directory category intensity, the sex, economic activity, origin and destination, in terms of urban-rural

division, were determined. The relative distance of migration was expressed by a breakdown into intra - and extra-provincial migrations. After the principal component analysis had been performed, it was found that six initial components distinguished — with eigen-values exceeding 1 — accounted for 73.6% of the total variance.

The first component, C_1^{III}, which accounted for 14.8% of the total variance reflects *the dominating direction of urban migration.* Domination of inter-urban migration — low component scores (Fig. 3), evidence a high degree of urbanisation. This type of migration is concentrated predominantly in urban agglomerations. Furthermore, the share of inter-urban migration is the highest in the cores of agglomerations, and gradually decreases with the increase in distance from the centre. This phenomenon should be viewed as a characteristic of distinctly developed agglomerations . This situation may be observed in the Katowice conurbation, the Warsaw and Gdańsk agglomerations. In the Katowice voivodship some rural areas reveal tendencies to transform into in-migration areas, although here the net migration to these areas, as to the rural areas of all the voivodships in 1977, was negative and amounted in the Katowice voivodship to — 3.6 per thousand.

The high component scores reflect much more intensive rural to urban and urban to rural migrations than urban to urban, thus determining the basic phase of the migration process. In these migrations, the greatest role is played by intra-regional flows. A mobility of this type indicates the compactness of the regional patterns. Thus, this component seems to well confirm the rule formulated by Ravenstein (1885 — 1886), i.e. that migration proceeds by stages from the smallest settlement units through consecutive links up the urban hierarchy. The areas with the highest component scores, i.e. the areas where the first stage of migration (rural to urban) dominates, encompass towns of the 24 eastern voivodships. The nature of these migrations corresponds to an early phase of urbanisation, when the rapid urban growth was due to migration from the countryside.

Urban residence is usually linked with skill improvement and with the gradual adoption of the urban way of life (Wirth 1938). Decisions concerning further migrations are influenced by an increasing number of elements. Due to formal and informal channels of information the amount of information about the job opportunities or housing conditions in other towns increases. Some opportunities are taken advantage of, and the choice of a town made during such migration is more rational and more conscious than during the first stage, when it is determined predominantly by external factors, e.g. location, distance or behaviour imitation, and when a migrant knows very little about the actual living conditions in the town. The choice made during urban to urban migration, i.e. on the second stage of migration, can be referred to as a qualitative choice.

Component C_1^{III} divides the country distinctly into two parts, the western part, with a domination of urban to urban migration or with a balance between directional categories and the eastern part, where rural to urban flows dominate. The first component can be descriptively referred to as *dominating direction of urban migration,* or theoretically (explanatorily) as *stages of migration.*

The second component, C_2^{III}, which accounted for 14% of the total variance, was called *intensity of in-migration.* Polish towns were arranged according to the decreasing component scores, i.e. to the decreasing intensity of in-migration. Since the analysis was based on normalized indices, i.e. the in-migration is measured in relation to the number of urban population, the commonly recognized in-migration centres, i.e. large urban agglomerations are not ranked highest but rather the medium-sized or even small towns, where the relative inflow indices are the highest.

The greatest number of centres with a very intensive in-migration is concentrated in north-eastern Poland. The rural to urban migration dominates in these inflows (C_1^{III}).

According to V. Davidovich (1972), the inflow to towns is inversely proportional to the urbanisation level attained. On the contrary, the origins of very intensive in-migration, e.g. in the Lublin/Głogów Copper Mining Basin are different. The high inflow is connected in these cases to the newly created labour market and to the high investments in mining. Of towns in the direct vicinity of Warsaw high inflows are also characteristic while in peripheral towns in the Warsaw region low inflows prevail. Simultaneously, there is rather an intensive outflow from both these areas. Migrations taking place here are impelled by a complex mechanism of transition through successive stages of migration in spatial terms, i.e.: contryside — small town — large city, as well as consecutive phases of temporary migration (cf. Dziewoński and Gawryszewski 1975; Potrykowska 1983).

Of towns with low component scores, low per capita inflow indices and weak effectiveness of migrations are characteristic. These towns are usually small. In towns sized 5000 or under out-migration exceeded in-migration.

Of the towns of the Wałbrzych voivodship negative net migration (−934) was characteristic in 1977 which, together with the large outflow from rural areas indicated an ongoing depopulation. Almost all the towns of the Częstochowa voivodship, the regional centre included, feature a very low intensity of inflows. This presumably resulted from the depletion of rural population surpluses within the local pool, due to their outflow to the Katowice conurbation, the latter being surrounded from the nortn and the west by numerous towns with low inflows.

The result of the analysis has indicated that the following factors have the greatest significance in the shaping of the inflow centres: (1) inflow to centres with high investment levels, e.g. towns of the Legnica voivodship; (2) inflows to towns in the less urbanised areas (north-eastern Poland); (3) inflows to large urban and industrial centres, in which the already existing industrial and tertiary sectors are being permanently modernised and developed; (4) inflow to towns located in the zone of direct influence of urban agglomerations (Warsaw, Gdańsk). All these underlies a constant demand for labour force and, therefore, the necessity of drawing on regional or even extra-regional labour resources when local reserves are drained.

The low inflows result most often from the weak in-migration attractiveness of the town for rural, and even more so for urban out-migrants (e.g. the towns of the Wałbrzych and Przemyśl voivodships). Sometimes low inflows are related to the emergence of another, heavily invested centre located in the vicinity, which absorbs the local labour surplus (e.g. the towns of the Częstochowa voivodship). These may also indicate, when outflows from rural areas are relatively low, an advanced phase of urbanisation (towns in Greater Poland).

The thrid component, C_3^{III}, which accounted for 11.4% of the total variance, defines *the level of human mobility*. The high component scores are characteristic of centres inhabited by an immobile population. Of these towns, with high density of population, low outflows, are characteristic, which involve a higher effectiveness of migration.

Among the towns of the least mobile population, more than 1/3 are the largest towns, sized 100 000 or over. The rule of component scores increasing with urban size is adhered to in a majority of cases.

An extreme concentration of people of low mobility and a high spatial arrangement of this type of towns is represented by the Katowice region. This area contains towns with the least mobile population. As the distance from the conurbation centre increases, in all directions, slowly and gradually component scores decrease, not to reach negative values. Outside of the Katowice region population of limited mobility is also concentrated in Greater Polish towns, in the Gdańsk Bay area, as well as in Cracow and in its suburban zone.

Warsaw is surrounded by a belt of towns with a negative net migration. There are

only 5 towns in the metropolitan voivodship of Warsaw, including Warsaw itself, with the population of limited mobility. This seems to be related to the fact that a considerable part of the urban population in the surroundings of Warsaw tend to move to Warsaw, while administrative restrictions on migration, as well as the tightneses of the housing market hamper direct moves to the city. On the other hand, the constantly developing metropolitan labour market is conditioned by the inflow of a new labour force from outside. As a result of this contradiction, the set of purely satellite towns emerged around Warsaw. After several years, the inhabitants of these small towns move to the city while their place is occupied by new in-migrants.

The outflow towns were identified on the basis of the low component scores. A considerable concentration of this type of centres occurred in two voivodships: Jelenia Góra (8 centres) and Olsztyn (4 centres). These centres usually constitute small towns. In 1977, almost 300 centres, sized less than 5000, had, as a unique group of towns, negative net migration. Besides this, only 5 larger centres, sized 10 000 were also defined as strong outflow centres.

In south-western Poland there are hardly any towns with sedentary population. Even of Wrocław, the largest city of this region, moderate component scores are characteristic. The lowest mobility is characteristic of Legnica, the centre of the Copper Mining Basin, which developed its own migratory shed. This may contribute to the increase in the number of outflow towns in the Sudetes Mts, of which considerable out-migration have been characteristic for years.

In north-eastern Poland there is no single town with a very immobile population, and in eastern Poland there are only two such centres (Lublin and Mińsk Mazowiecki). Towns with low or very low population mobility there constitute merely 12% of all the towns. The fact that there are voivodships where even the regional centre does not feature at least moderate component scores is disadvantageous, and this is particularly characteristic of the post-1975 voivodship centres, e.g. Chełm, Zamość, Biała Podlaska, Ostrołęka, Łomża, Suwałki and Piła.

High outflows seem to be related to a significant degree with the "push effect", which may result from the limited number and weaker differentiation of jobs, from worse living conditions, including housing, as well as from parochialism and the lack of social tolerance. Inhabitants of these centres are attracted by large, vigorous urban places. Their attraction is often so great that it overcomes the friction of distance.

A more detailed analysis of the component pattern indicated that within the re-gained territories there are only four cases of the highest component scores. Nearly all the towns with high shares of population of limited mobility are concentrated in central Poland. Their western extent is limited by the pre-war Polish-German boundary, and only 4 towns of this type are located to the east of the Vistula-San river line.

On the basis of what has already been written it can be concluded that high mobility is characteristic of the inhabitants of the smallest towns and of those located in the re-gained territories. Young people, with a higher migration propensity, are much more numerous in the western and northern territories than in central Poland, where shares of an older and more sedentary population are relatively higher. Simultaneously, people who have completed a migration are much more likely to move on. This is the case of the re-gained territories.Thus, migration also reflect the division of the country into the pre-war and re-gained territories. Two main factors may be, therefore, identified which underly human mobility: urban size and age structure of inhabitants, related to the propensity of migration.

Three further components were interpreted as: C_4^{III} — *regional migration closure degree*, C_5^{III} — *economic activity level*, and C_6^{III} — *age structure of migrants*.

The performed analyses indicate that migration in Poland, as a social and demographic phenomenon, is rather complex. Each of the components distinguished, differentiates towns in its specific way. The same centre may simultaneously be recognized as inflow and outflow centre. Urban size does not determine the rank of a town in terms of component scores. Rather, the urban rank results indirectly from inter-urban flows, this fact being well expressed by the first component scores, C_1^{III}. It should be noted, however, that since the analyses were based upon normalised indices, the results obtained can hardly be compared with those performed earlier and based upon absolute figures.

4. INTEGRATED SPACE

Finally, integrated demographic space was studied. In order to accomplish this, a principal component analysis was performed on the set of all the 47 diagnostic variables (see Table 1), representing the demographic relations in towns generally.

The investigated demographic space is not a simple sum of individual subspaces. In cases of detailed analyses, 70% of the total variance of diagnostic variables were accounted for by 6 or 7 components, i.e. 19 components for all the analyses, while the same share of the total variance in a joint analysis was accounted for by just 14 components. This implies a slighlty larger synthesizing role of the joint analysis, although more precise structure obtained from detailed analyses seems to better approximate the reality

A correlation analysis between some of the new and the previously obtained components was performed. The high correlation coefficients (above +0.8) together with the component structure implied that some of the new components are fairly good approximations of the dimensions obtained in the detailed analyses. This indicates their particular significance in the studied demographic space and also the fact that these persistent dimensions most decisively differentiate the demographic structure of Polish towns. These dimensions are: C_1^{II}, i.e. *dominant function and social structure*, C_1^{I} — *effect of post-war migration*, C_2^{II} — *age structure and educationl level*, C_1^{III} — *dominating direction of urban migration*, C_4^{II} — *economic activity rate of the retired*, C_4^{III} — *degree of regional migration closure*, C_5^{III} — *economic activity rate of migrants.*

In the joint analysis two important components appeared, i.e. C_3^{IV} — *polarisation of the productive age population, and* C_5^{IV} – *effectiveness of migration.*

Due to the different directions of male migration — attracted by heavy industry, and of females — gravitating towards the large trade and administrative centres, the disparity in the distribution of sexes in the productive age is gradually being increased, entailing heavy consequences from the demographic and more generally social points of view.

A strong positive correlation between effectiveness and intensity of inflows, on the one hand, and employment in construction and the share of the tertiary educated employees, on the other, was observed. This regularity is connected with inflows to investment projects.

It was revealed that only in the case of 5 components did the joint analysis reallocate some of the variables previously used to describe individual subspaces. Other components are significantly loaded only by homogeneous sets of variables. This confirms the emergence of the three subspaces: demographic, socio-occupational and migratory, which were recognized as separate in the theoretical model. On the basis of the joint analysis, as well as the correlation analysis for all variables it can be found that

the three subspaces do overlap in certain areas. It is migratory subspace that is the more closely related to the two others. This fact is confirmed, *inter alia*, by the high correlation coefficients of migratory variables with the variables describing other subspaces.

The performed studies indicated that the urban demographic phenomena display a greater variability in the regional than in the hierarchical patterns (Rykiel 1978). The locational factor is usually most important, while the urban size determines in a much lesser degree the nature of individual elements of the demographical phenomena studied.

The problem, which is beyond the scope of the work herein presented, even though rather important, would be an evaluative account of the basic dimensions which differentiate urban demographic space within the national settlement system. On such an account, the most handicapped towns might be identified in which immediate measures should be undertaken against the intensification of the processes leading to the disadvantageous transformations of the demographic structure.

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REDISTRIBUTION OF THE ELDERLY POPULATION IN POLAND REGIONAL AND RURAL-URBAN DIMENSIONS

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INTRODUCTION

The ageing and the elderly are among the common key-words in the social science literature today. One more specific theme, i.e. migrations by the elderly population, is of a particular interest to geographers as well as to some demographers and sociologists. The elderly migrants are found to reveal distinct behaviour and motivation patterns, hence this branch of studies is clearly separated from the main stream research on human migrations, and often closely interlinked with other lines of research on the elderly populations (see for example, Cribier 1982; Warnes 1982; Warnes and Law 1983).

In Poland, the studies on elderly migrations were introduced by M. Latuch in the early 1970s (see: Latuch 1974, 1977; Bondaruk 1976) and focused initially on magnitude and causes of out-migration by elderly persons from the major cities, in particular Warsaw. More recently, a comprehensive analysis of social and economic factors of elderly migration was carried out by K. Stolarczyk (1985). Her study, was based on a special survey among a sample of persons aged 60 years and over who changed their place of residence during four selected months in 1979. In a parallel study, based on current population registration data, E. Frątczak (1984) attempted to estimate the role of rural-to-urban migrations, against fertility and morality change, in the growth of the elderly population numbers in Poland between 1950 and 1978. Finally, P. Korcelli and A. Potrykowska (1986) discussed interdependencies between mobility rates and family status of elderly migrants, and presented an analysis of migrations of the elderly by age and cause.

The present paper looks into spatial patterns of the elderly population and the recent configurations of elderly migration in Poland. Basic reference units comprise 49 vivodships, i.e. administrative regions of the upper level. Some migration data are also presented for a more aggregated division into urban and rural areas. Geographical distribution is an important dimension from the social policy perspective. Compared with other countries in Europe, the ageing of the population of Poland is neither very advanced nor particularly rapid. However, spatial concentration of the elderly population, as well as specific patterns of its redistribution, generate a number of policy issues on the regional and local level. Such problems range from the provision of specialized services to the maintenance of housing and the utilization of farmland.

EVOLUTION OF THE ELDERLY POPULATION

Table 1 documents the growth in the size of the elderly population in Poland from less than 3 million to over 5 million, and from some 10 per cent to some 14 per cent of the total population during the last 25 years. Traditionally, the elderly population has been overrepresented in the rural areas. While in 1960 the share of those areas in the total population of Poland was 51.7 per cent, they accounted for 55.2 per cent of the populaton in the age group 60 years and over. In 1985 the corresponding figures were 39.8 and 46.2 per cent; hence the disparity has become even somewhat greater. Anoter feature is a notably higher proportion of females among the elderly in urban areas.

The rate of growth of the elderly population has been higher than of the total population over most of the period since the Second World War, the only exception being the late 1970s, when smaller cohorts born at the time of the First World War were entering the 60 and over age category. The number of persons in the retirement age has increased almost twice as rapidly as the number of those in the labour force age. The corresponding rates were 2.37 and 1.41 between 1950 and 1984. Total dependency rates, defined as the combined number of persons in 0 —17 and 60 (65) plus (females/males) age groups per 100 people in the 18 — 59 (64) years category, went down from 83.1 in 1960 to 68.3 in 1978. However, since then the index values have increased again to 68.9 in 1982 and 74.2 in 1984. These figures conceal substantial inter-regional variations; in 1982 the values ranged from 57.0 in the capital voivodship of Warsaw to 85.9 in the voivodship of Nowy Sącz where high fertility and net out-migration of persons in the working age coincides with net in-migration of the elderly.

The age composition of the population of Poland, together with the observed fertility and mortality trends, allow one to anticipate a further increase of the size of the elderly population, as well as its share among the total population, during the next decades. According to a series alternative population projections (see: Korcelli and Potrykowska 1986) the size of the population in age groups 60 and above would increase to between 6.2 — 6.3. million by the year 2000, and its share to between 15.4 — 15.7 per cent. During the first decade of the next century the absolute number of the elderly people would decline slightly and their relative size is likely to drop substantially, down to 14.8 — 15.2 per cent of the total. At that time, small surviving cohorts born during the Second World War will move into the elderly age groups. The ageing process is likely to accelerate rapidly again around the year 2010, when the baby-boom cohort of the 1950s will be gradually found in the 60 years and over category. This category may expand so as to account for between 18 and 20 per cent of the total population by the year 2020. In an even more distant future, the current projections envision a stabilization of the share of the elderly population at the level of 16—19 per cent.

These figures are based on ceratain assumptions concerning future fertility, mortality and migration patterns. The assumptions in turn, are derived from past and current observations, hence their validity in strictly limited. However, with respect to the next decade or so the range of uncertainty is quite small. In any case, the years 1986 — 1990 will bring a particularly high (some 0.5 million) increase in the number of the elderly. The 1990s will feature still substantial, although gradually decreasing additions and a slower growth in proportion of the elderly among the total population. These are the develpoments which have to be accounted for in the short-and mid-term socio--economic planning (see: Holzer 1986).

REGIONAL PATTERNS

The distribution of the elderly population in Poland by 49 voivodships in 1978 and 1984 is represented in Figs 1A to 5. The time span between the two years is relatively

TABLE 1. Poland: population aged 60 or over, 1960 — 1985 (thousands)

Years	Total				Urban			Rural		
	total	%	males	females	total	males	females	total	males	females
1960	2848.1	9.56	1132.6	1715.5	1276.8	467.9	808.9	1571.3	664.7	906.6
	100.0		39.8	60.2	100.0	36.6	63.4	100.0	42.3	57.7
1965	3515.8	11.14	1440.5	2075.3	1621.5	616.3	1005.2	1894.3	824.2	1070.1
	100.0		41.0	59.0	100.0	38.0	62.0	100.0	43.5	56.5
1970	4234.6	13.00	1737.9	2496.7	2036.0	773.0	1263.0	2198.6	964.9	1233.7
	100.0		41.0	59.0	100.0	38.0	62.0	100.0	43.9	56.1
1975	4696.1	13.73	1904.3	2791.8	2375.5	897.8	1477.7	2320.6	1006.5	1314.1
	100.0		40.5	59.5	100.0	37.8	62.2	100.0	43.4	56.6
1980	4723.6	13.22	1876.6	2846.6	2464.8	919.0	1545.8	2258.8	957.4	1301.4
	100.0		39.7	60.3	100.0	37.3	62.7	100.0	42.4	57.6
1984	5103.9	13.80	2009.6	3094.3	2725.5	1021.0	1704.5	2378.4	988.5	1389.9
	100.0		39.4	60.6	100.0	37.5	62.5	100.0	41.6	58.4
1985	5210.9	13.95	2047.2	3163.7	2803.9	1052.2	1751.8	2406.9	995.0	1411.9
	100.0		39.3	60.7	100.0	37.5	62.5	100.0	41.3	58.7

Source: Demographic Yearbooks, various years, Central Statistical Office, Warszawa.

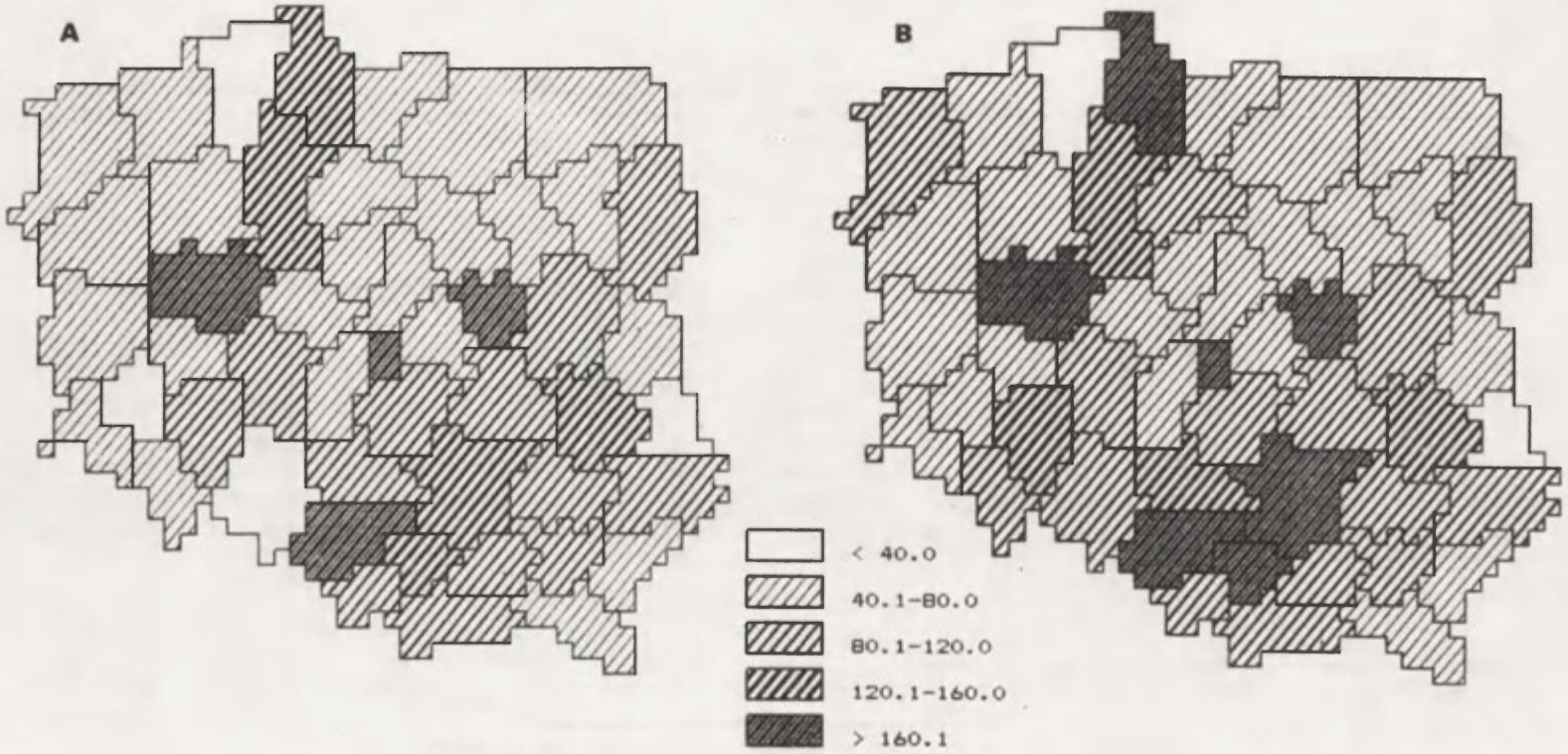

Fig. 1. Number of population aged 60 and over (,000): A — 1978, B — 1984

short, but in coincides with a period of substantial shifts in basic demographic patterns in Poland, in particular with a sharp increase (followed by a decrease since 1983) of fertility rates, and a decline (by about one third) of internal migration rates. Although the impact of these changes has been less pronounced in the case of the elderly than of some other population age categories, it cannot be regarded as negligible. In fact, a drop in spatial mobility of the elderly has been one of the salient features of changing migration patterns during the early 1980s.

As Fig. 1A shows, main spatial clusters of the elderly population in 1978 corresponded to the urban agglomerations of Warsaw, Katowice, Łódź, and Poznań. By 1984 (Fig. 1B) the pattern became intensified and three other voivodships joined that category of regions, each with more than 160 thousand people in the 60 plus age group. Two of these regions are heavily urbanized (Cracow and Gdańsk), but the third (Kielce) is predominantly rural, and characterized by net out-migration. In the case of the male elderly population, this pattern is somewhat blurred, and hence spatial concentration is even more distinct when looking at the distribution of female elderly population.

A different pattern emerges when shares of those in the age of 60 years and over within the total population are plotted for individual regions (see Figs 2A to 4B). It is predominantly the rural regions of Eastern and Central Poland that are characterized by an overrepresentation of older people. At the other end of the scale are demographically "young" areas in northern and western parts of Poland. Again, this rule holds true mainly on account of the female population distribution. In 1984, a solid block of eastern and central voivodships featured a high share (16 per cent and over) of the elderly among all female population, while in several voivodships in the Northern and Western Poland the corresponding shares were still as low as 10 to 12 per cent.

High and low shares of the elderly among the total population are found in both urban and rural, as well as in- and out-miration regions. These dimensions, although important on a local scale, are dominated by the macro-regional division into northwestern and southeastern part of Poland, each with a distinct population age composition. This division is also evident from Fig. 5 which presents the ratio of the size of the aged 60 and above to the 0 to 14 age category. Not surprisingly, the top values of the index correspond to the urban agglomerations of Łódź and Warsaw. This is due to the combined effect of low birth rates and large shares of the elderly among the total population in these regions.

The volume of elderly migrations in Poland has fluctuated over time. From the early 1950s until the early 1970 s the number of moves by people in the age groups 60 years and over was generally increasing, while the number of all internal migrations was falling (see Fig. 6). Since then the two trends have converged. The rapid decrease in the total number of migrations since 1978 is matched by an even faster drop in elderly migration numbers. Out of the total of 964 thousand moves in 1978, the elderly accounted for 6.5 per cent; the corresponding figures for 1985 are: 650.6 thousand and 5.9 per cent. The number of moves by the older persons was reduced by almost one half (63 to 38 thousand) during the seven-year period under discussion.

The recent downward trend in rates of internal migration in Poland has generally been attributed to the shrinking volume of housing construction and to the evolving population age composition, i.e. a decrease in the proportion of young adults — the group with the highest migration propensities — in the total population (see: Korcelli, in this volume). The latter factor, of course, is irrelevant for an interpretation of the dispproportionate drop in the elderly migration since 1978. Taking this into account, and also keeping in mind the diverging trends in the volume of the total and of the elderly migration during earlier decades, one has to emphasize the specific nature of elderly mobility over space. Hence, a study the mechanisms and causes of elderly migrations should be treated as a separate task rather than as just another aspect of general migration studies.

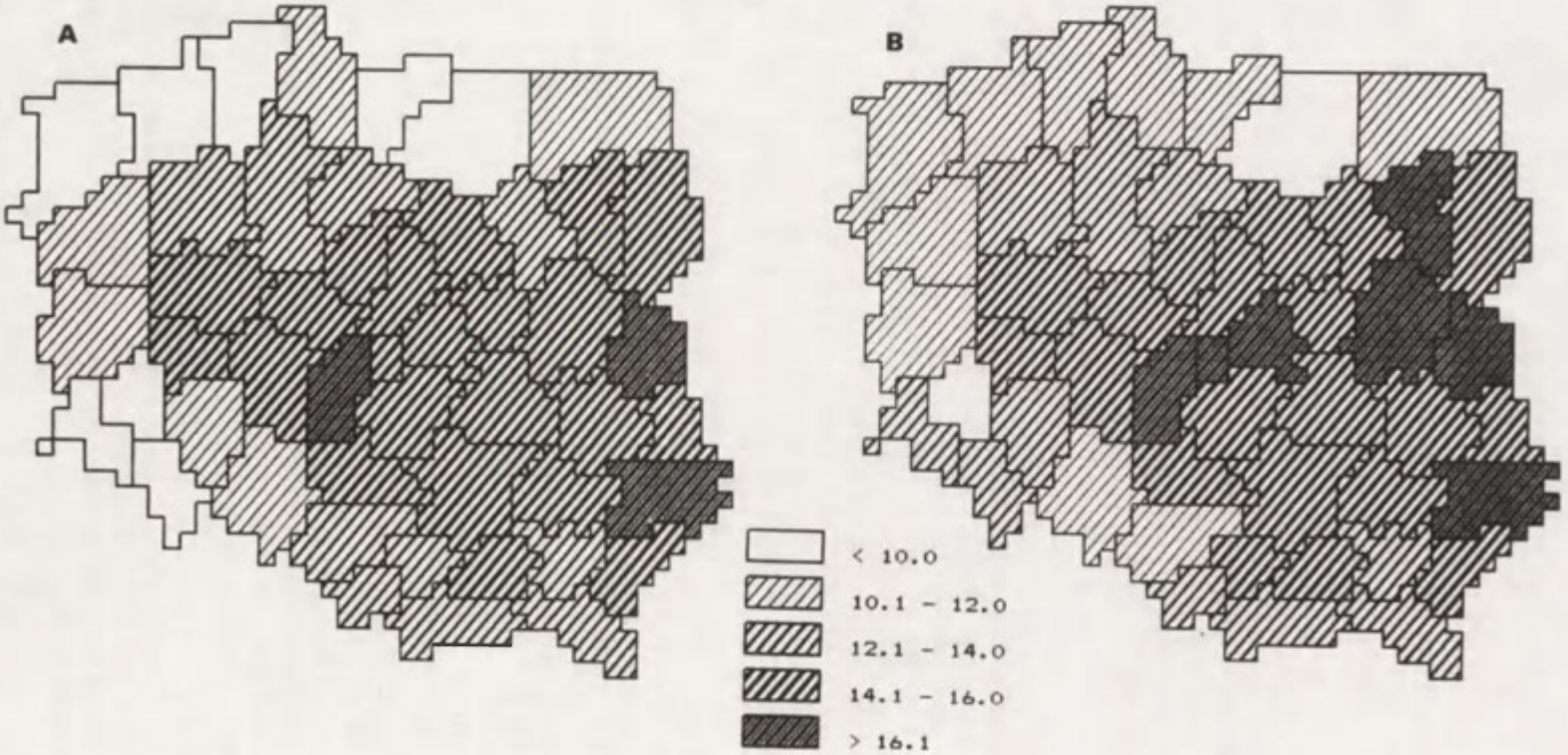

Fig. 2. Percentage of population aged 60 and over: A — 1978, B — 1984

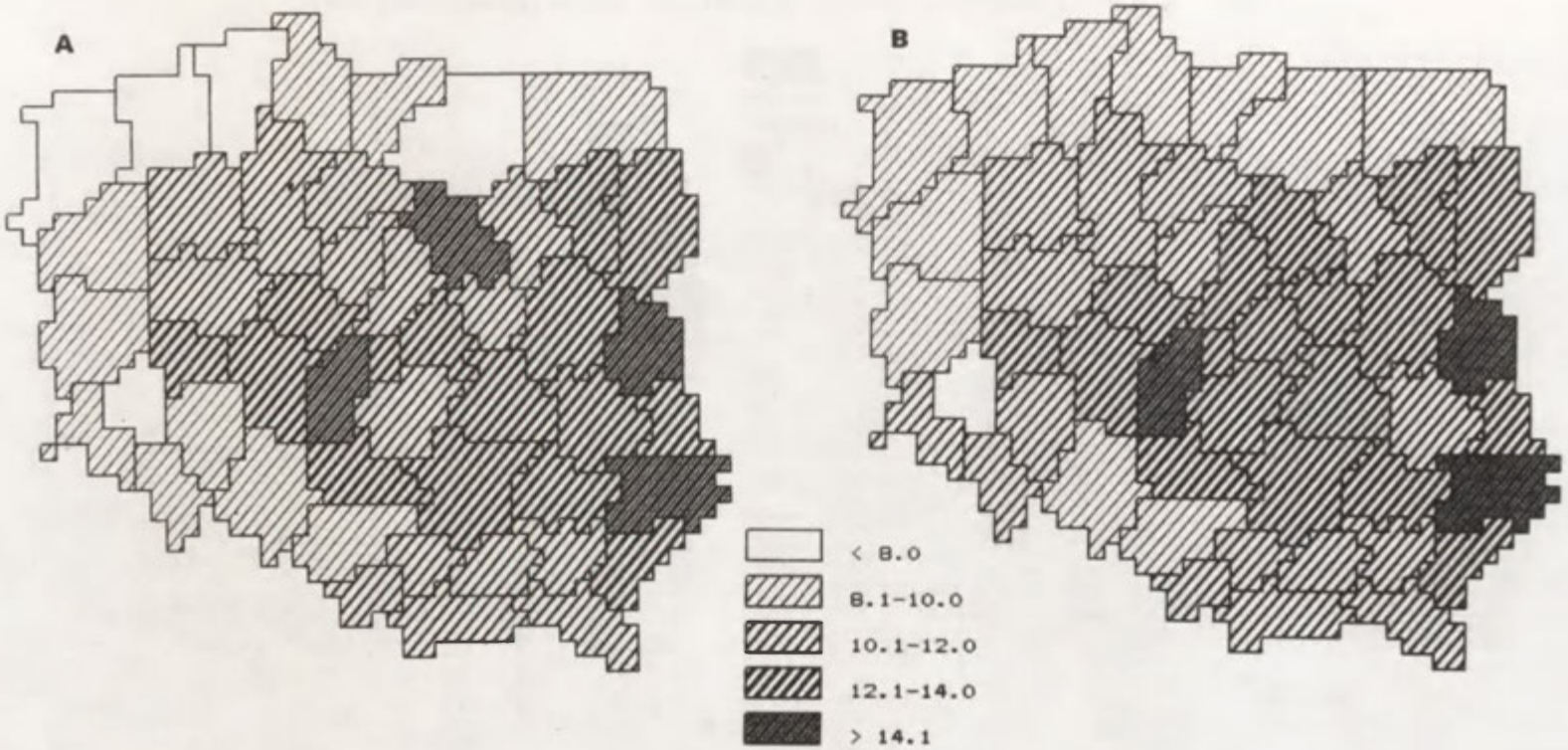

Fig. 3. Males aged 60 and over (percentage of the total male population): A — 1978, B — 1984

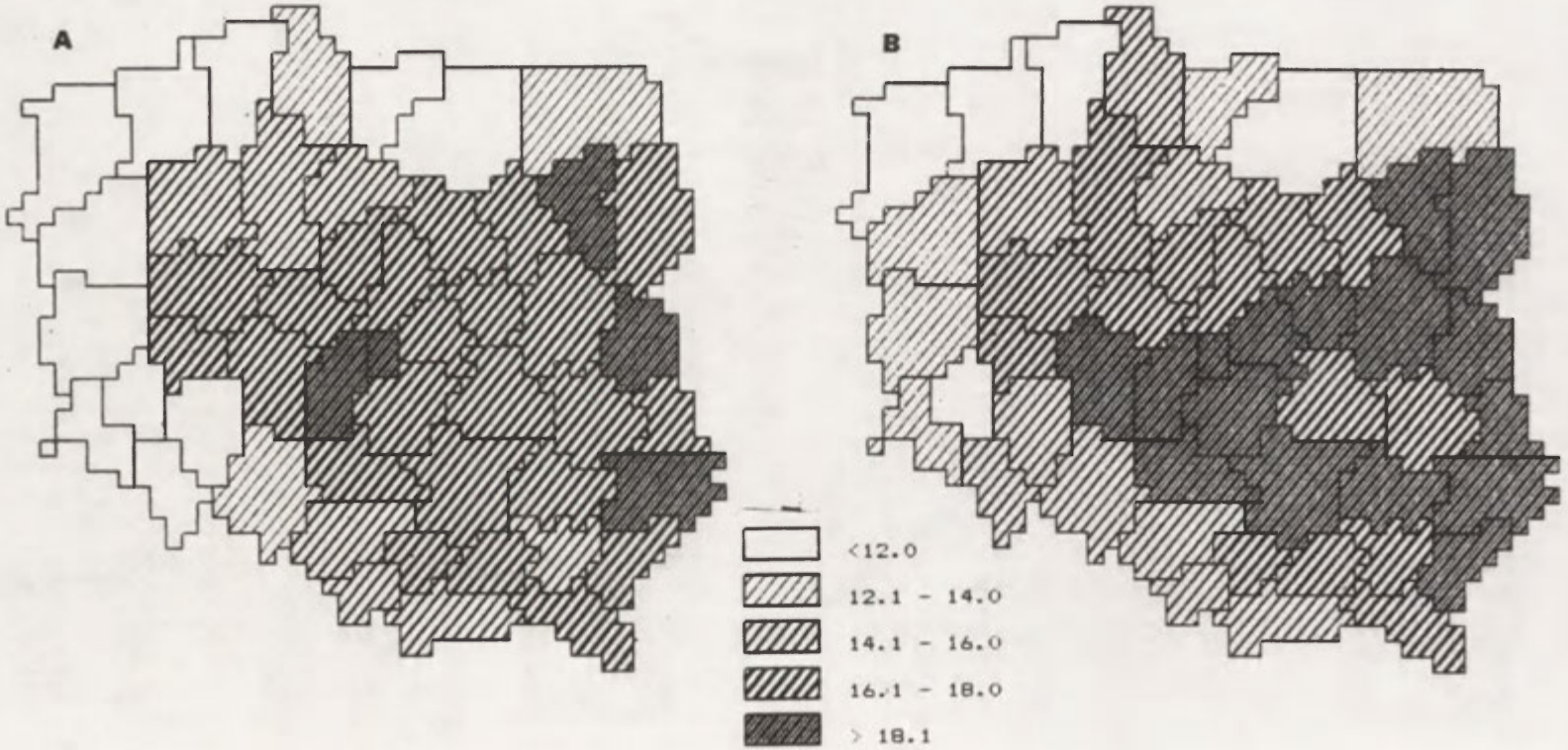

Fig. 4. Females aged 60 and over (percentage of the total female population): A — 1978, B — 1984

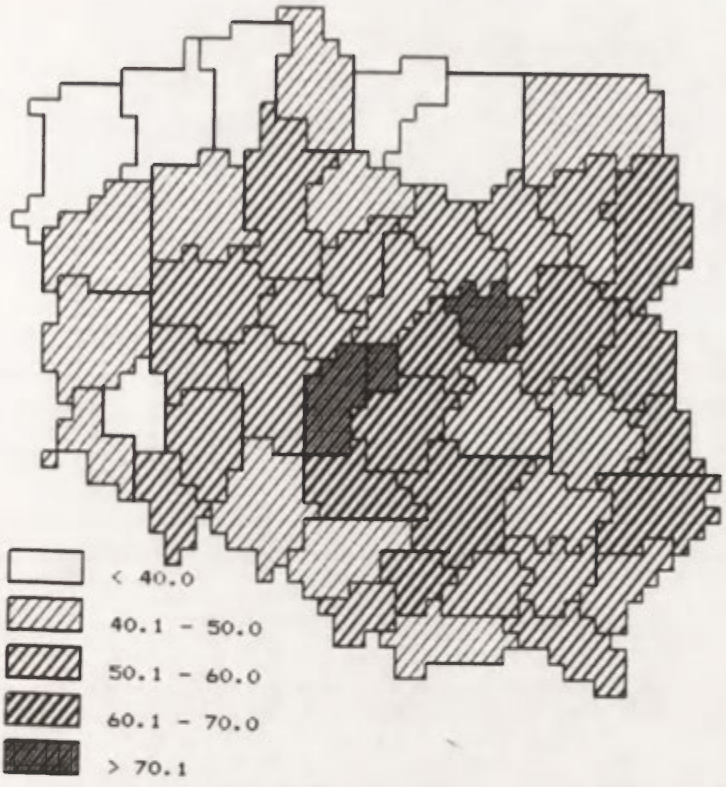

Fig. 5. Spatial distribution of the aging index (ratio of those aged 60 and over to those aged 0 — 14), 1984

Figures 7A to 10B present alternative measures of elderly migrations by the 49 voivodships. A number of similarities can be discerned between regional patterns of in- and out-migration. This is partly explained by the nature of the data used which include inter- as well as intra-regional moves. Thus, high in- as well as out-migration rates characteristic of regions with high overall spatial mobility of the population, i.e. the northern and western regions. Large shares of the elderly among all migrants, on the other hand, is a feature of eastern and central regions, where the proportion of persons in the age groups of 60 years and over within the total population is higher than in the nation as a whole. The main feature of the 1984 patterns, when compared with the 1978 patterns, is lower intensity of the former. One more specific change that occurred between 1978 and 1984 is an increase in spatial mobility of the elderly population in the south-central regions that encompas the urban agglomerations of Cracow and Upper Silesia. That trend may reflect the growing awareness on part of the elderly population, towards the environmental hazards in that heavily industrialised area.

The distribution of the absolute volume of in-migration resembles the elderly population distribution. The largest inflows occur towards the major urban agglomerations and other urbanised regions, including Katowice, Warsaw, Bydgoszcz and Gdańsk. Despite a decline in the flow volume, the rank of the voivodships hardly changed between 1978 and 1984. However, shifts in respective ranks can be identified

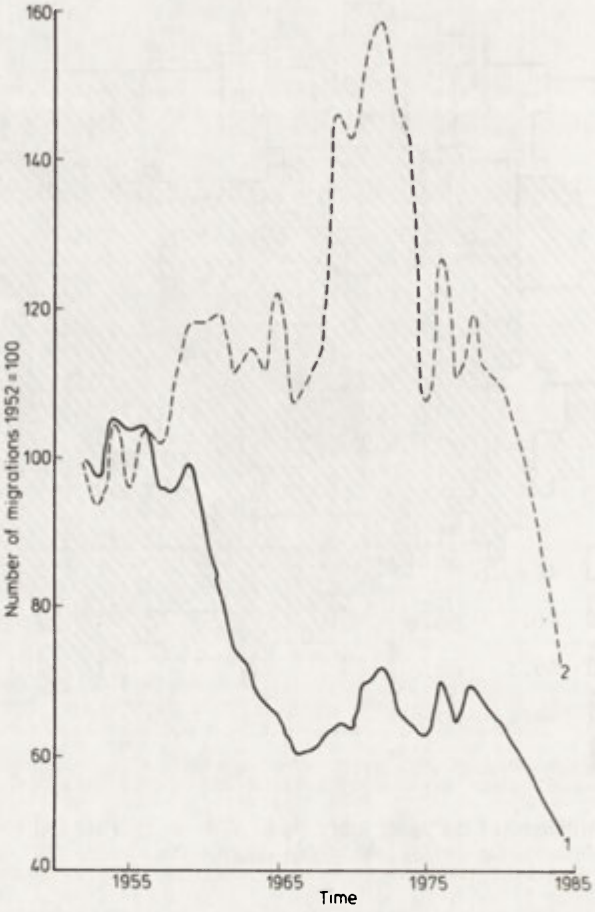

Fig. 6. Change in the volume of migration 1952 — 1984: 1 — total migration, 2 — elderly migration

when the volume of elderly in-migration is presented as percentage of total in-migration (Fig. 7A and 7B). In 1978, all the top ranks were occupied by voivodships situated in the eastern and central part of Poland: Kielce, Łódź, Białystok and Lublin; by 1984, Warsaw moved to the first, and Cracow to the fourth rank.

Interestingly enough, the in-migration rates (number of moves per 1000 persons in the age groups of 60 years and above) are still the highest in the northern and western voivodships, i.e. areas of high spatial population mobility in general (see Fig. 8A and 8B). An elderly resident of northern and western regions has a greater probability of migrating compared with his counterpart in central and eastern Poland. On the other hand, a typical migrant in the latter regions is more likely to be an elderly person.

As suggested earlier, similar generalizations pertain to regional patterns of elderly out-migration (see Figs 9A to 10B). Against a rapid decrease in general mobility, a relative increase in the rates of the elderly out- migration in the Cracow and Upper Silesian region between 1978 and 1984 is noticeable. A decrease in migration rates since the late 1970s has been particularly sharp in the case of long-distance moves. The share

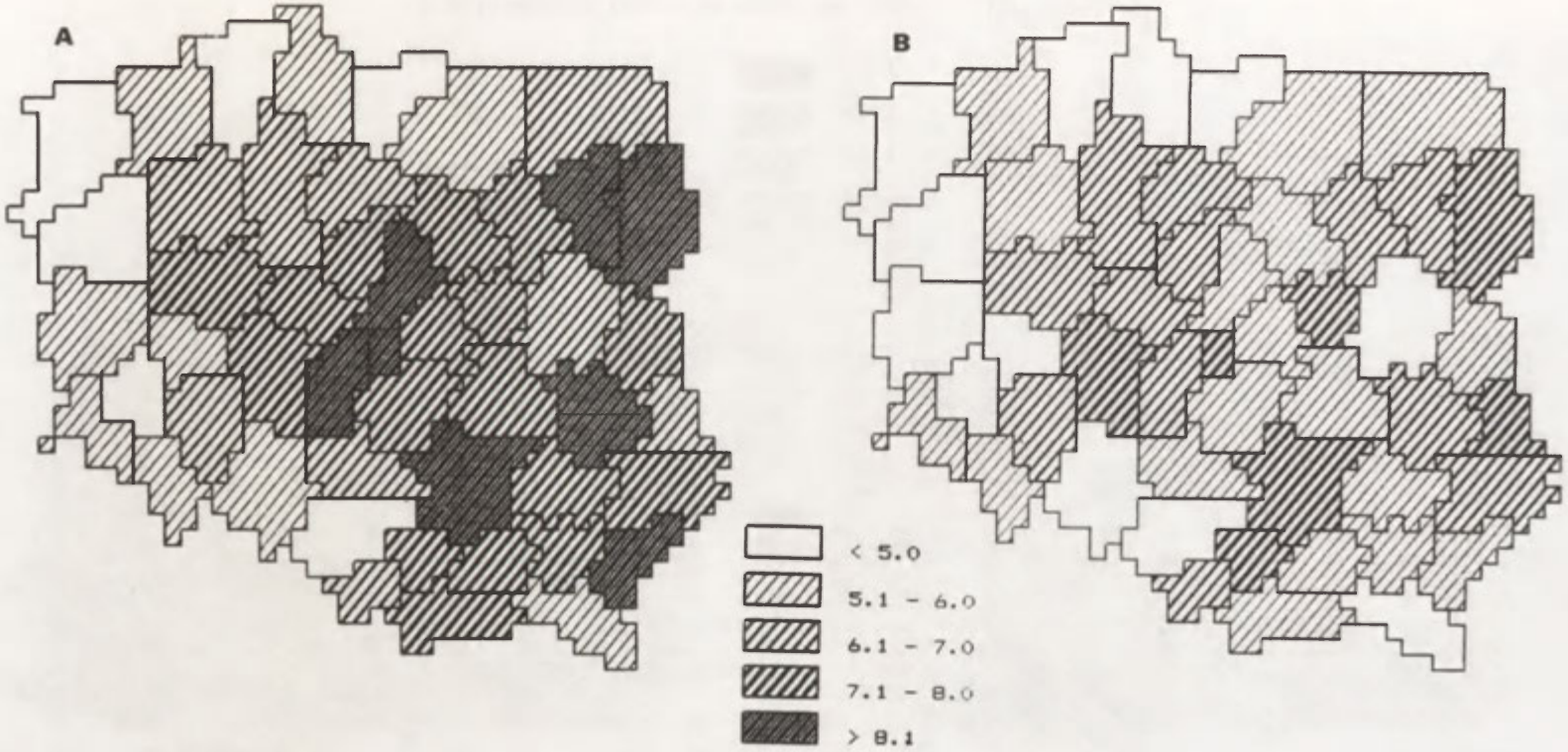

Fig. 7. Elderly in-migration as a percentage of total in-migration A — 1978, B — 1984

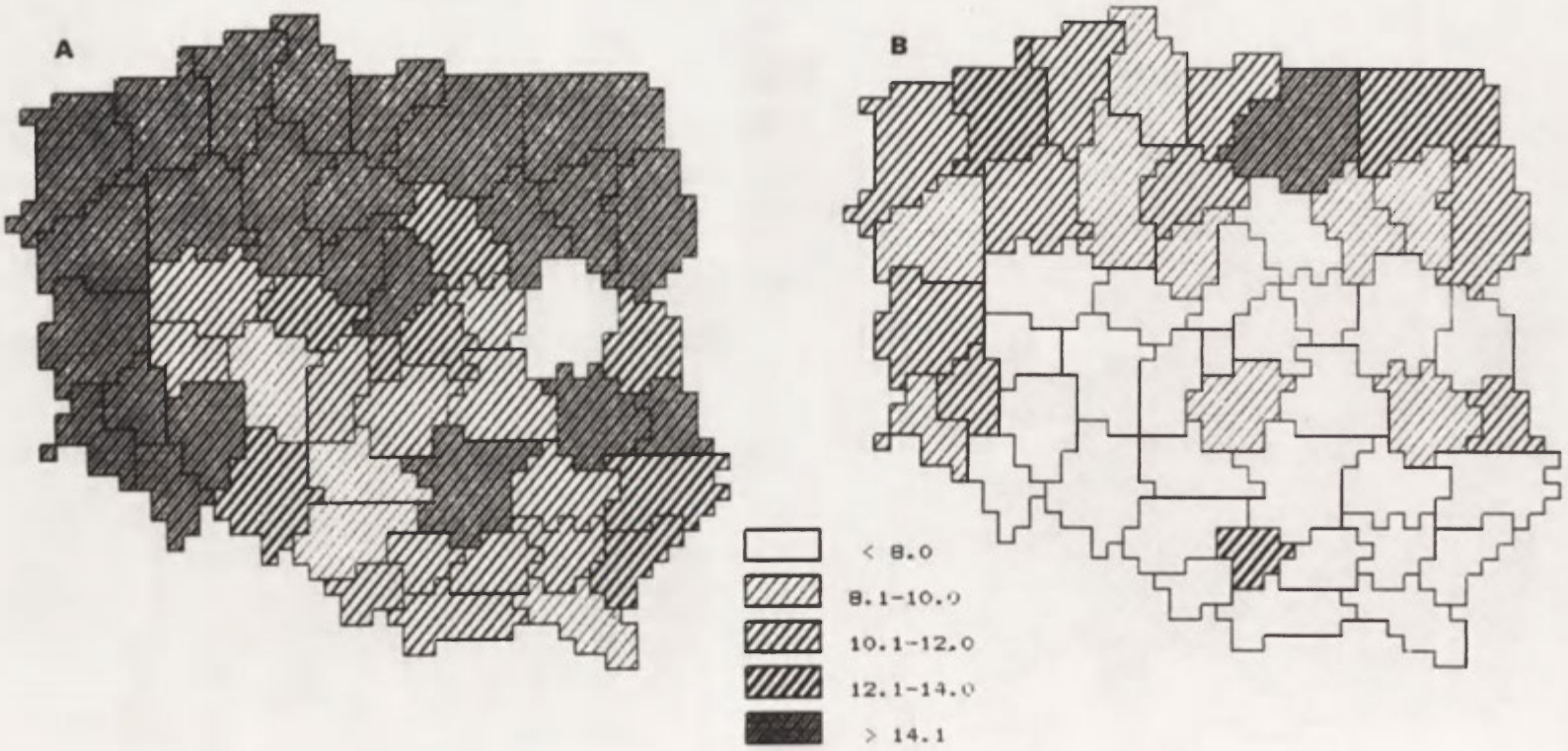

Fig. 8. In-migration rates of the elderly (per 1000) A — 1978, B — 1984

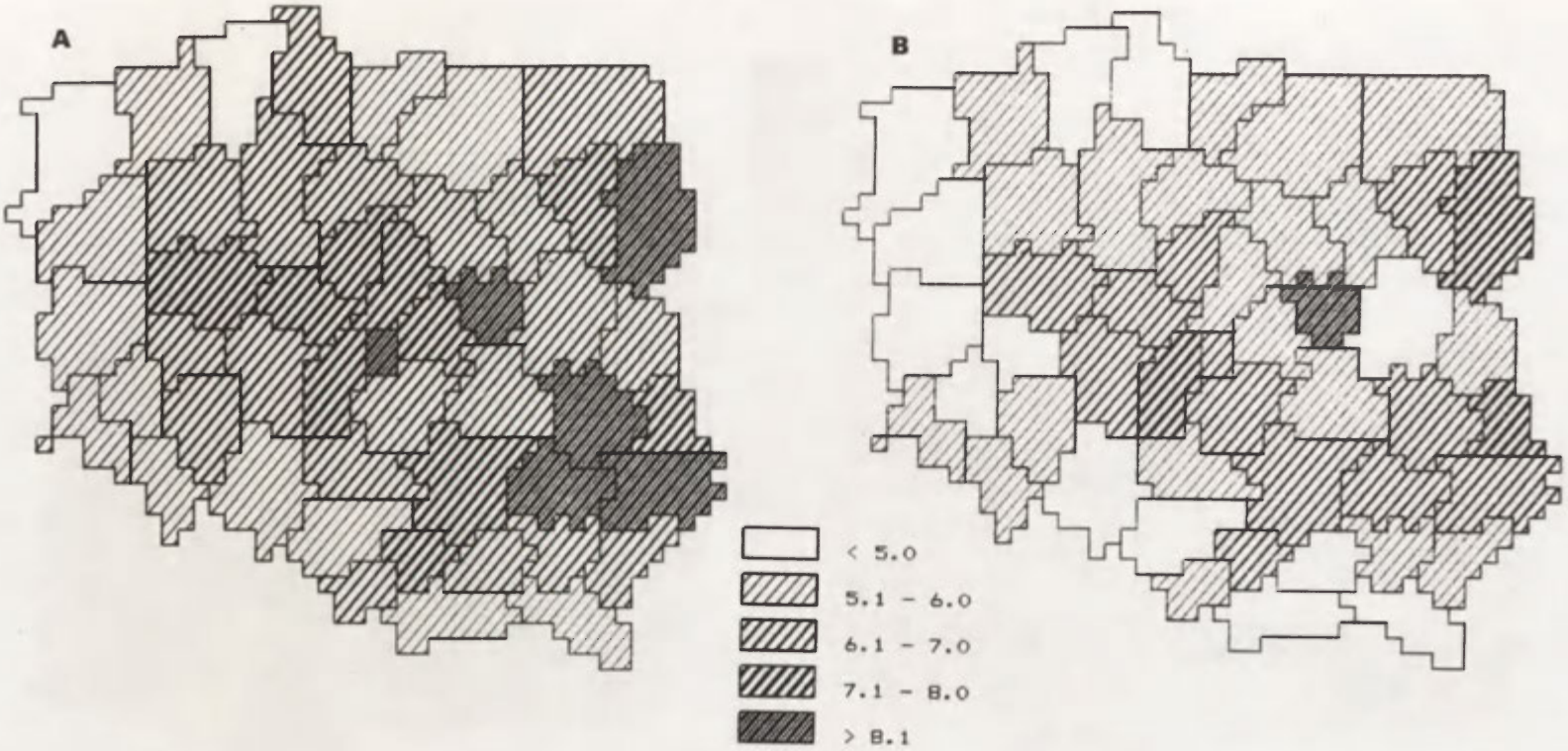

Fig. 9. Elderly out-migration as a percentage of total out-migration A — 1978, B — 1984

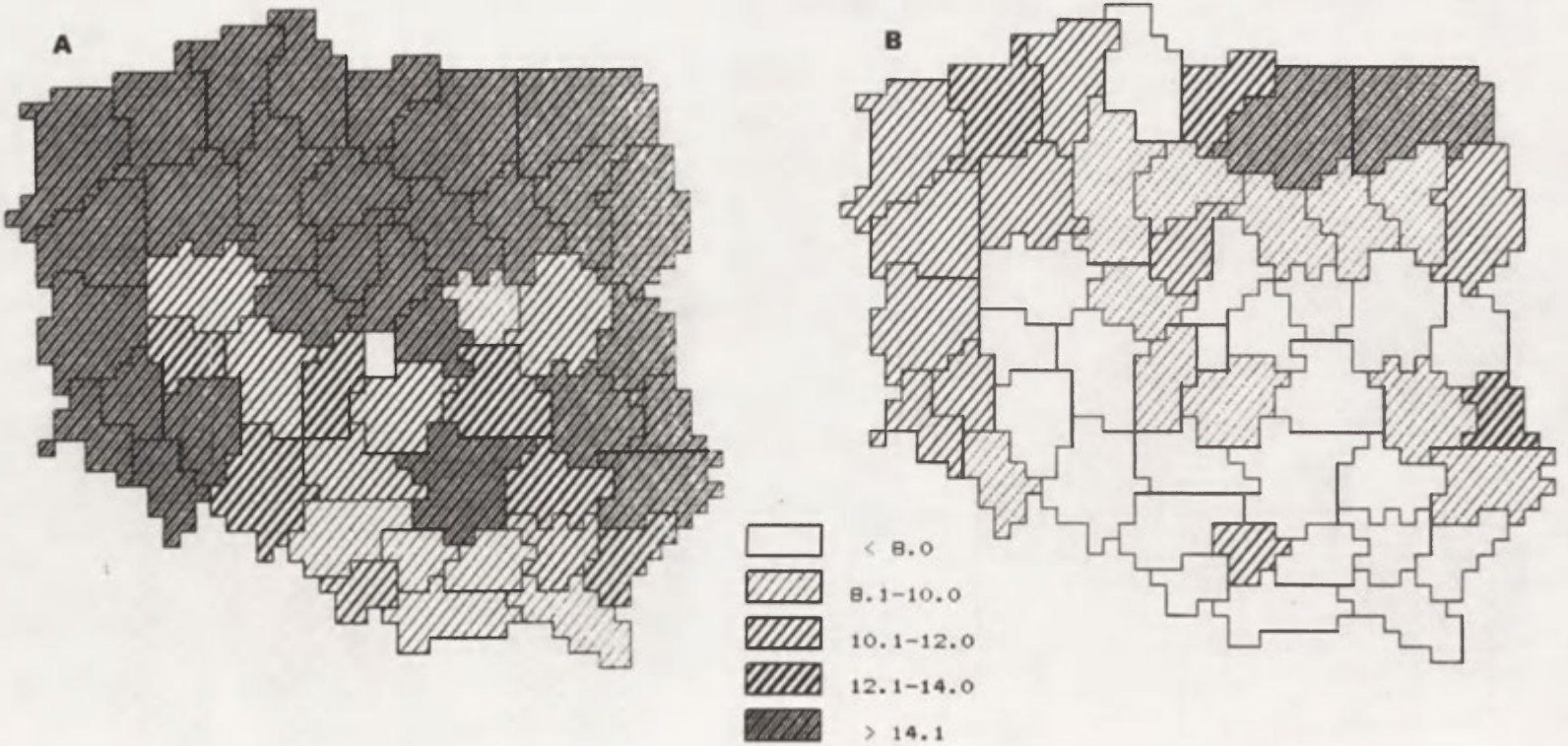

Fig. 10. Out-migration rates of the elderly (per 1000) A — 1978, B — 1984

of intra-voivodship migrations by the elderly increased from 50.4 to 57.9 between 1978 and 1985. The percentage of women among the elderly migrants has somewhat declined. This trend can be noticed in case of both inter- and intra-regional moves (see Table 2). As to the age distribution of elderly migrants, the positive association between mobility rate and age was stronger for shorter-distance (i.e. intra-voivodship) moves both in 1978 and 1985 (see Fig. 11).

TABLE 2. Elderly migrations: inter-regional and intra-regional moves 1978, 1985

Years	Total ,000	%	Males ,000	—	Females ,000	%
			Total			
1978	63.086	100.0	19.097	30.3	43.989	69.7
1985	38.394	100.0	12.548	32.7	25.846	67.3
			Inter-regional migration			
1978	31.265	49.5	8.987	28.7	22.278	71.3
1985	16.167	42.1	5.095	31.5	11.072	68.5
			Intra-regional migration			
1978	31.821	50.4	10.110	31.8	21.711	8.2
1985	22.227	57.9	7.453	33.5	14.774	66.5

Source: Demographic Yearbook 1986, Migration data 1978, CSO, Warszawa.

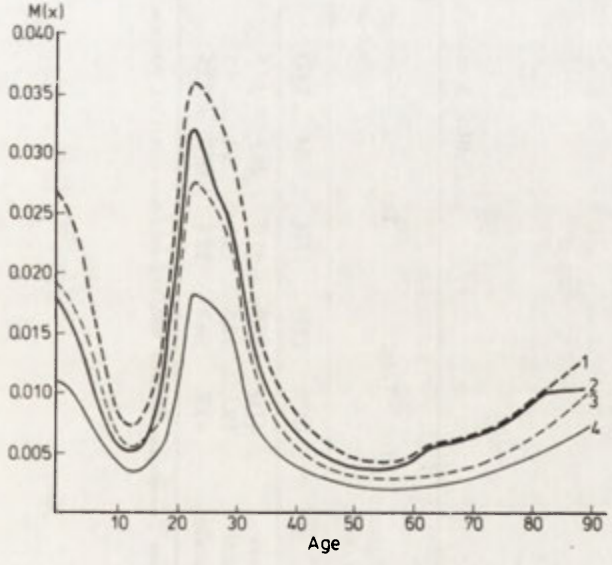

Fig. 11. Migration-by-age schedules 1 — intra-regional, 1978, 2 — inter-regional, 1978, 3 — intra-regional, 1985, 4 — inter-regional, 1985

TABLE 3. Elderly migration by sex and type of move, 1978, 1984

Migrants (,000)	Total		Total		Urban in migration				Rural in-migration						Net-migration to urban places	
					urban-urban		rural-urban		total		urban-rural		rural-rural			
	1978	1984	1978	1984	1978	1984	1978	1984	1978	1984	1978	1984	1978	1984	1978	1984
Total	63.0	38.9	41.0	24.9	17.5	11.1	23.5	13.8	22.1	14.0	12.1	7.6	9.9	6.5	11.3	6.2
Males	19.1	12.6	12.6	8.1	4.9	3.4	7.7	4.7	6.5	4.5	3.0	2.2	3.5	2.3	4.7	2.5
Females	43.9	26.3	28.4	16.8	12.6	7.7	15.8	9.1	15.6	9.5	9.1	5.4	6.4	4.2	6.6	3.7

Source: Demographic Yearbook 1985, Migration data 1978, CSO, Warszawa.

RURAL — URBAN PATTERNS

Inter-regional variations in the population ageing and spatial mobility become somewhat less pronounced when each region is disaggregated into its rural and urban component. In fact, the rural areas in every single voivodship were losing elderly migrants in net terms, both in 1978 and 1984. The urban areas, on the other hand, were gaining in all regions except the two peripherally located voivodships of Chełm and Wałbrzych. Large urban agglomerations are among the main recipients of elderly migration. This, among other factors, is likely to be related to their function as centres of specialized medical services.

Basic patterns of rural-to-urban migrations of the elderly people have been stable since the early 1950s. Thus the process of ageing of the rural population has somewhat been lessened as a consequence of rural-to-urban flows of the elderly. This effect, however, has been minor compared to the impact, upon the age composition of the rural population, of large net rural migration loss among young adults and childern.

Consequently, when elderly migrations are arranged by rural and urban origins and destinations (Table 3), the rural-to-urban flows appear as the largest category. The urban-to-urban flows which have been less affected by the recent mobility decline, hold the second rank. As data in Table 3 and Fig. 12 demonstrate, compared to rural-to-urban migrations, the inter-urban flows feature a higher proportion of female migrants, and relatively higher mobility rates for the very old persons.

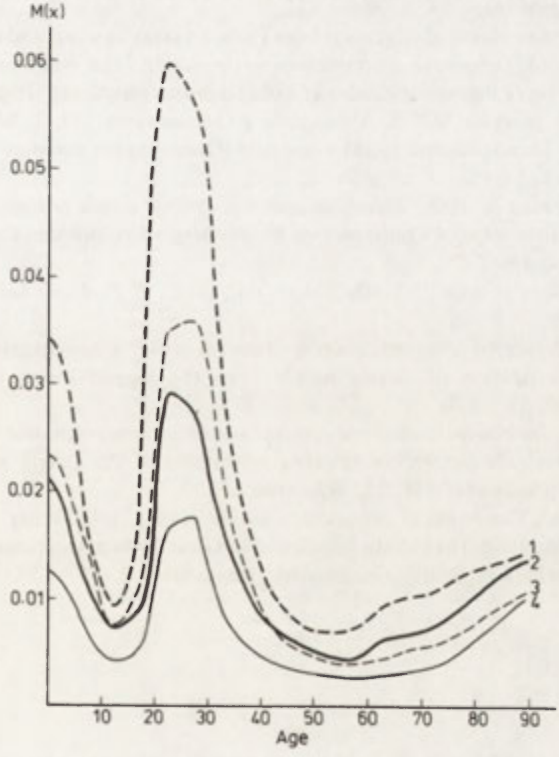

Fig. 12. Migration-by-age schedules: 1 — rural-to-urban, 1978, 2 — urban-to-urban, 1978, 3 — rural-to-urban, 1985, 4 — urban-to-urban, 1985

CONCLUSIONS

This paper documents the recent patterns of migration and spatial redistribution of the elderly population in Poland. It also provides a background for the subsequent analyses that will focus on causes of elderly migration and on such migrants' characteristics as sex, age, marital status and education. As the material presented above demonstrates, the regional as well as rural-urban variations in the rates of elderly migration are quite distinct and relatively stable over time. Higher rates are characteristic of northern and western regions where all population groups tend to be more mobile. The percentage of the elderly among all migrants is higher in eastern and central regions where the process of population ageing is more advanced than elsewhere. Urban areas are net gainers in the elderly migrations vis-à-vis rural areas, and large cities receive a disproportionate share of elderly migrants.

These variations should be taken into account in the design of in-depth studies on elderly migration. Such studies, among others, might focus on specific areas, in particular those which receive, and/or send relatively large numbers of elderly migrants, as well as on regions which are likely to generate a sizeable out-migration of the elderly in the near future owing to the evolving age composition of their population.

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ELDERLY PEOPLE IN THE SOCIO-SPATIAL STRUCTURE OF SOME POLISH TOWNS

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The phenomenon of population ageing has long since attracted the attention of the representatives of the medical and biological sciences, and also of the social sciences. An example of the latter can be provided by social gerontology, this being the domain of the scientific enquiry, which is concerned with the entire complex of the social, economic and demographic conditions in which old people exist. This domain also includes a consideration of the economic security polices for the elderly in the form of insurances and pensions as well as the accessibility of health services and welfare.

Geographers endeavour to participate in studies on social gerontology through a demonstration of geographic aspects of the spatial organization of society, and through demonstration of the inter-relation between human beings and their environment (Warnes 1981, 1982; Rudzitis 1984). The spatial aspects of population ageing appear in many geographical studies. The diversity of the interests which has increasingly characterized geography throughout the recent decades, has created the formation of an empirical research trend which could be defined as a geographical studies on the elderly population. Within the British and American geographical literature the beginnings of studies on old age population are attributed to Zelinsky (1966), Golant (1972), and Peet and Rowles (1974). Recent reviews (Warnes 1981) and monographs (Warnes 1982) make it possible to distinguish several groups of the problems which have attracted the interest of geographers. The majority of the studies concentrated on migration and analyses of spatial distribution within countries and regions. This report concerns studies of intra-urban scale.

Analyses of the distribution of particular demographic groups within urban space have been conducted for some time. Thus, for instance, Newcombe (1961) described differentiation of the age structure depending upon its location within urban space. Similarly, studies conducted within the framework of the concept of social area analysis and factor ecology provide information on age differentiation in urban space. The objectives of these analyses were, however, broader, aiming at a description and interpretation of the social structure of the towns, within which demographic differentiation is only one of the elements. The dimensions of family status, life-cycle as well as the demographic-migratory parameters, distinguished in the studies of factor ecology, also permitted a description of the demographico-spatial differentiations. Independently of the widely applied factor ecology, alternative techniques for describing the diversification of the age structures of the population are being sought and proposed. Thus, for instance, Coulson (1968) applied a regression analysis, Forrest and Johnston (1981) applied an entropy analysis to the age-wise classification of spatial units, and Schulz

(1982) applied segregation indices. In all these studies it is possible to grasp the question of the distribution of the elderly population within the urban space in relation to other demographic groups.

Analyses of the distribution of elderly population alone are, however, rare; one of the recent ones in this domain being the paper of Compton and Murray (1982) concerning Belfast. More attention is devoted to a consideration of the spatial mobility and activity of older people, as well as to the planning and spatial structure of the housing environment, viewed from the aspect of its influence on the activity and degree of independence of older people, see Herbert and Peace (1980), Wiseman and Virden (1977). A specific group of research problems relate to the analyses of the accessibility older people have to various sorts of services, see e.g. Pinch (1979). Spatial differentiation of population age structure on a national and regional scale are quite well known in Poland. It suffices to recall the typological works of Welpa (1955), Migacz (1950/1951) and Jelonek (1971) and also the more general and analytic studies of Dziewoński and Kosiński (1967), Dziewoński et al. (1977) or Frątczak (1984). There are, however, very few geographical studies concerning particular age groups. Bielecka (1973), for instance, considers the geographical aspects of the ageing of the rural population in Poland. Likewise on the scale of individual towns, from the oldest studies, such as those of Wąsowicz (1935), throughout the post-war ones, e.g. Jelonek (1968), when the demographic structures of whole towns were analyzed.

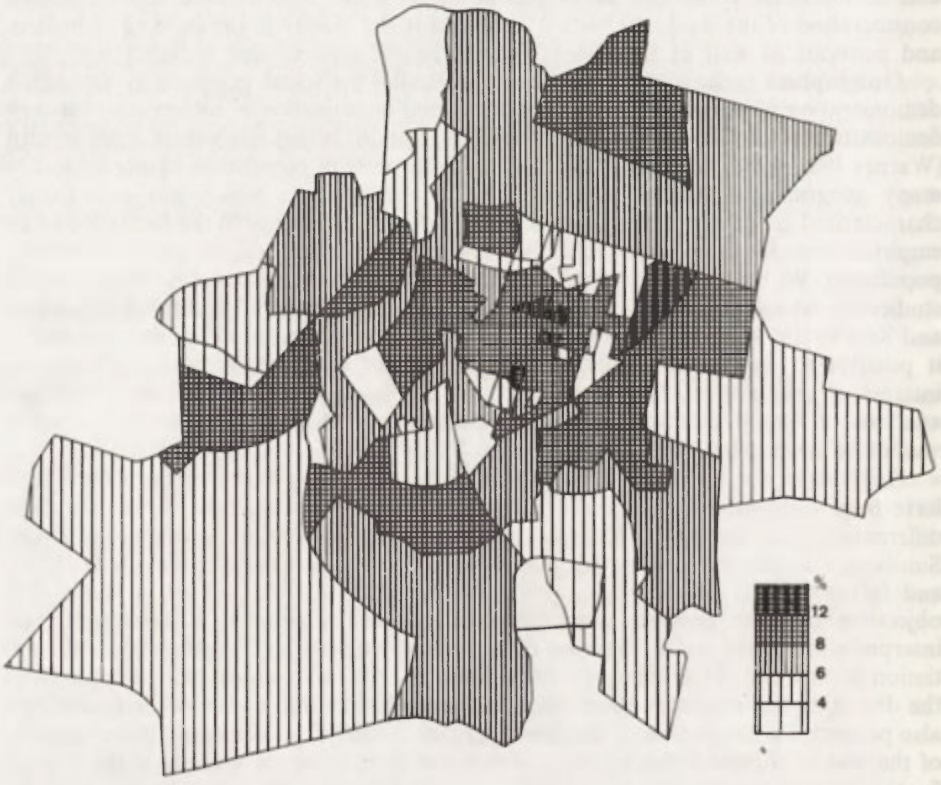

Fig. 1. Population aged 65 and over in per cent of total population, Radom 1970
Non-shaded areas indicate unpopulated territory

An exception here is the work by Bystroń (1915) who devoted much attention to the distribution of particular age groups, including old people, in his description of the demographic diversification of Cracow. According to Bystroń, the share of the older age cohort in particular parts of towns is related to the economic nature of those parts of a town. Within the trade-oriented areas there are fewer elderly people who, on the other hand, have a much greater population share in the wealthier areas. Then, Bystroń goes on to state that the share of old people (over 60 years of age in that study) had increased in the 1880 — 1900 period, a fact that Bystroń attributes first of all to women, who "(...)converge to Cracow to live on their pensions and for religiousness" (Bystroń, 1915 p.153). The latest study concerning demographical structure on the intra urban differentiation scale, is the paper by Jelonek (1984), and, related to somewhat broader socio-ecological problems the paper by Zbieg (1978). When analysing the demographic differentiation of urban space in the towns of Southern Poland, Jelonek observes a higher share of the older population in downtown areas and a gradual decrease of this share when moving outside, towards the town peripheries.

Similar conclusions can be drawn on the basis of broader studies on socio-spatial structures (Węclawowicz 1981, 1982). In the studies conducted within the framework of factor ecology the variables describing professional and social structures, also the education, origin and household organization of the population included those describing demographic structures. In all the studies the category of "population of 65 and more years of age in % share of total population" appeared. This category usually constituted a very significant interpretative constituent of such principal components as "housing situation of family households", "demographic-migratory position", "origins

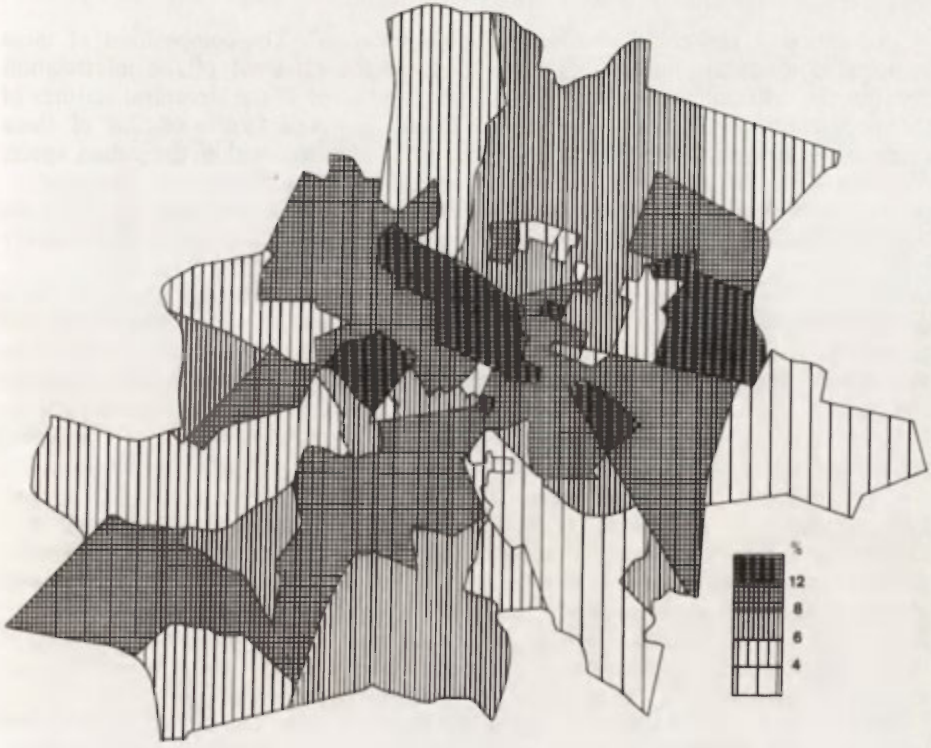

Fig. 2. Population aged 65 and over in per cent of total population, Radom 1978

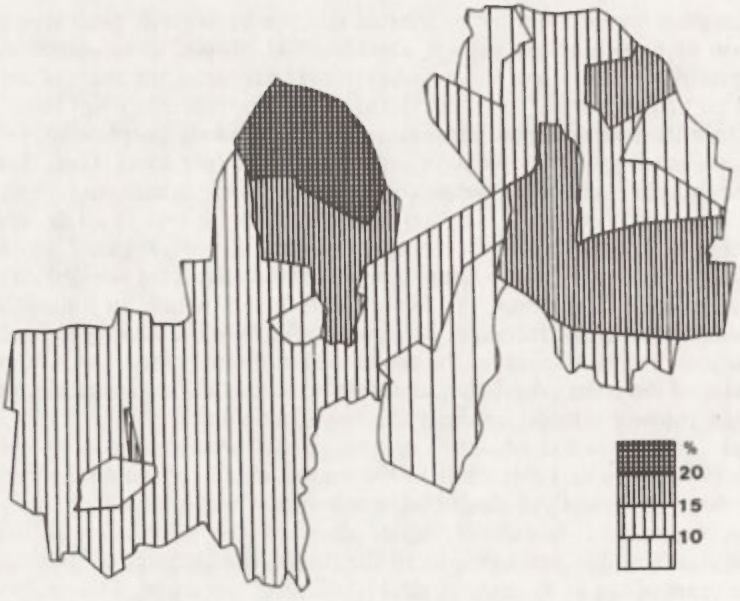

Fig. 3. Population aged 65 and over in per cent of total population in the town cluster: Grodzisk Mazowiecki, Milanówek, Brwinów and Podkowa Leśna, 1970

of population", "household and demographic situation". The composition of these principal components made it possible to guess the existence of the interrelation between the distribution of old age population, and some of the structural features of the population and housing conditions. In all, a rough approximation of these components described the life cycle of the urban dwellers within the urban space. Analyses of the distribution of component values and of particular variables made it possible to disinguish within the urban space the areas being simultaneously dominated by older housing, people living alone and small households. The position of the elderly in the socio-spatial structure of a town can be deducted from the correlation matrix, calculated prior to the principal component analysis for particular towns. A more detailed analyses can be performed by extracting from the correlation matrix the correlation coefficients for the variable "population of 65 and more years of age in % share of the total population" and all the other variables. In all the towns subject to analysis the strongest were correlations with the variable "flats constructed prior to 1944 in % of the total flats number". Thus, the spatial distribution of the oldest population group is strongly correlated with distribution of the oldest housing.

This phenomenon was most pronunced in the group of towns comprising Pruszków, Piastów and Ursus ($r = 0.804$), in Rzeszów ($r = 0.795$), Częstochowa ($r = 0.759$) and Cracow ($r = 0.741$). The lower values of the correlation coefficient between the spatial distribution of the elderly and of old housing characterized the town cluster of Wołomin ($r = 0.654$) and such towns as Warsaw ($r = 0.617$), Opole ($r = 0.575$), Słupsk ($r = 0.521$), Radom ($r = 0.505$), Olsztyn ($r = 0.429$), and Lublin ($r = 0.419$). The insignificant value of this correlation coefficient was obtained for the town cluster of Otwock ($r = 0.170$), and a very low value for the town cluser of Grodzisk Mazowiecki ($r = 0.365$).

The differentiation of towns as regards the situation of the elderly can be attributed to a number of elements. As a rule, the highest strength of correlation links between people advanced in age and old housing occurred for those towns that suffered

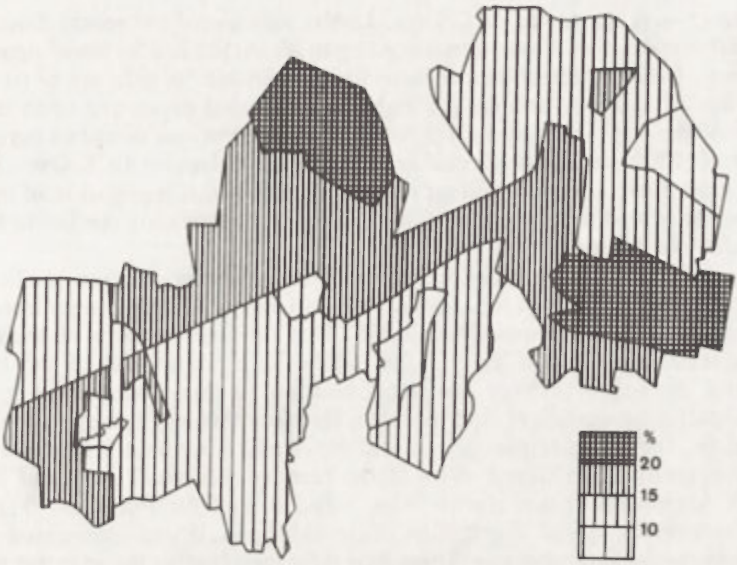

Fig. 4. Population aged 65 and over in per cent of total population in the town cluster: Grodzisk Mazowiecki, Milanówek, Brwinów and Podkowa Leśna, 1978

relatively little destruction during World War II. In the towns belonging to the Pruszków cluster, although they were slightly destroyed, new flats were mainly constructed for the needs of the expanding industry, for employees in the productive age. Older people in these towns had smaller chances of obtaining new flats than was the case in the larger towns.

The low or even insignificant values of the correlation coefficient in two town clusters located near Warsaw — i.e. Grodzisk Mazowiecki and Otwock can be explained by the character of the towns — having a summer vacation orientation and "bedroom" function. The higher share of the elderly in some areas of Podkowa Leśna, Milanówek or Otwock resulted not only from the ouflow of younger people, but also from an inflow of the elderly, desiring to settle there permanently, often in new houses and in a better natural environment. When considering the values of the correlation coefficient between the variable "population of 65 and more years of age" and the variables describing housing conditions, the set of towns can be divided into two groups. In the towns of the Northern and Western Lands, in some of the towns located near Warsaw and in Lublin, the correlation coefficients between the elderly population and the indices of flats standards were very low. Decidedly higher (in absolute terms, for they were negative) values of these coefficients characterized Rzeszów, and the town cluster of Pruszków, Łódź and Cracow. Thus, it could hypothesized that in general, in 1970, elderly people in the first of towns lived in definitely worse housing conditions than they did in the second group of towns.

The correlation coefficient values for the variable "population of 65 and more years of age" and variables describing the number of persons in household form the following „pattern". The highest positive values appear for the relation of the elderly population to one-person households. On the other hand, there are higher negative correlation coefficients values for the relation of elderly population to three- and four-person housholds. This "pattern", however, is not followed at all in the case of the Otwock

town cluster, and the towns of Olsztyn, Lublin and Słupsk. It seems, therefore, that spatial differentiation of population according to life cycle has a far lower significance in these towns. Other correlation coefficients for the variable "population of 60 and more years of age" and other variables are highly differentiated depending upon the specific situation of the population in a given town. The interrelations described herein for the situation of 1970 were also confirmed in the analyses of data for 1978. Over this period of eight years there also occurred an increase in the spatial segregation of the elderly. This is partly related to an increase in the value of the correlation coefficient for elderly people and old housing.

Within the Grodzisk Mazowiecki town cluster, these correlation coefficients had increased from 0.365 in 1970 to 0.560 in 1978, in Cracow — respectively from 0.761 to 0.783, and in Radom from 0.505 to 0.796. This is some evidence of the increasing overrepresentation of the elderly in the old housing estates and of the limitations concerning the accessibility of new accomodation to this demographic group. The growing spatial segregation of older people is also seen through a comparision of spatial distributions, though constrained by a different breakdown into census units, of this population group in 1970 and 1978, in the cases of Radom (Figs 1 and 2), for the Grodzisk Mazowiecki town cluster (Figs 3 and 4) and for Piaseczno (Fig. 5).

The data on the spatial distribution of the older population, commented on herein derive from the national censuses. These data refer therefore, to the so called night-time population. During the day a majority of people leave their place of residence and go to work, to school and for shopping — to places usually located in other parts of the town. Thus, the demographic composition of particular areas of a town also changes quite

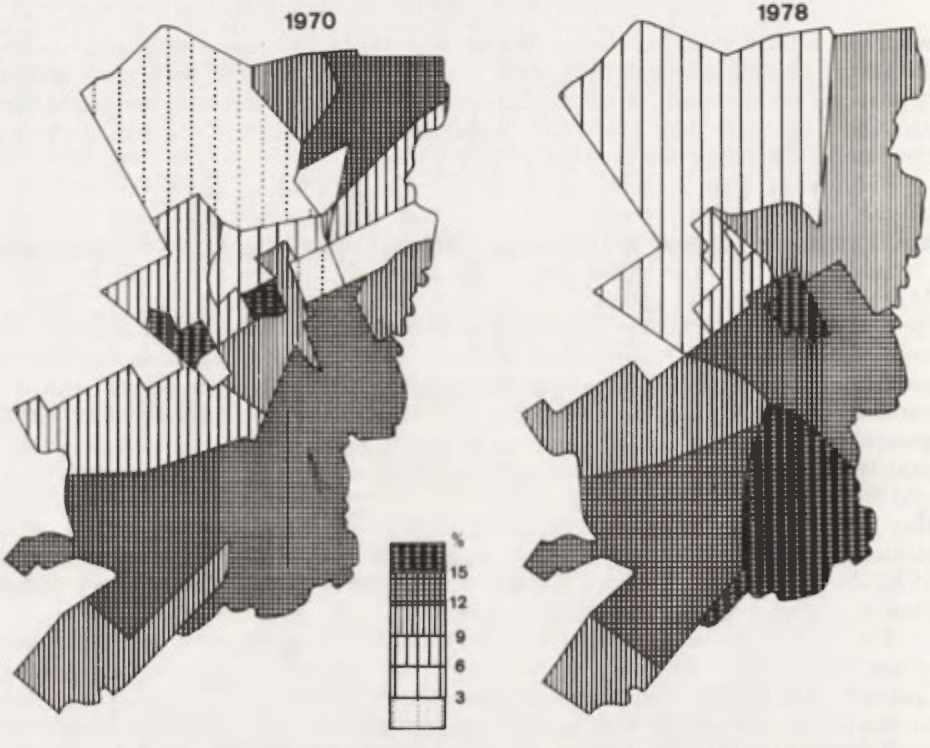

Fig. 5. Population aged 65 and over in per cent of total population, Piaseczno
Non-shaded areas indicate unpopulated territory

considerably during the day. On the basis of simple observations one can conclude that during working hours within the housing estates more elderly people and more women with small childern are to be seen, while in the areas of job concentration more persons in the professional activity age can be observed whereas in the areas where school and universities are located — there are more young people. Hence, the percentage share of the elderly in different parts of a towns depend also upon the time of the day.

To perform a spatial analysis of this phenomenon certain simplifying assumptions were adopted. Basic data were taken from the national census of 1978, concerning

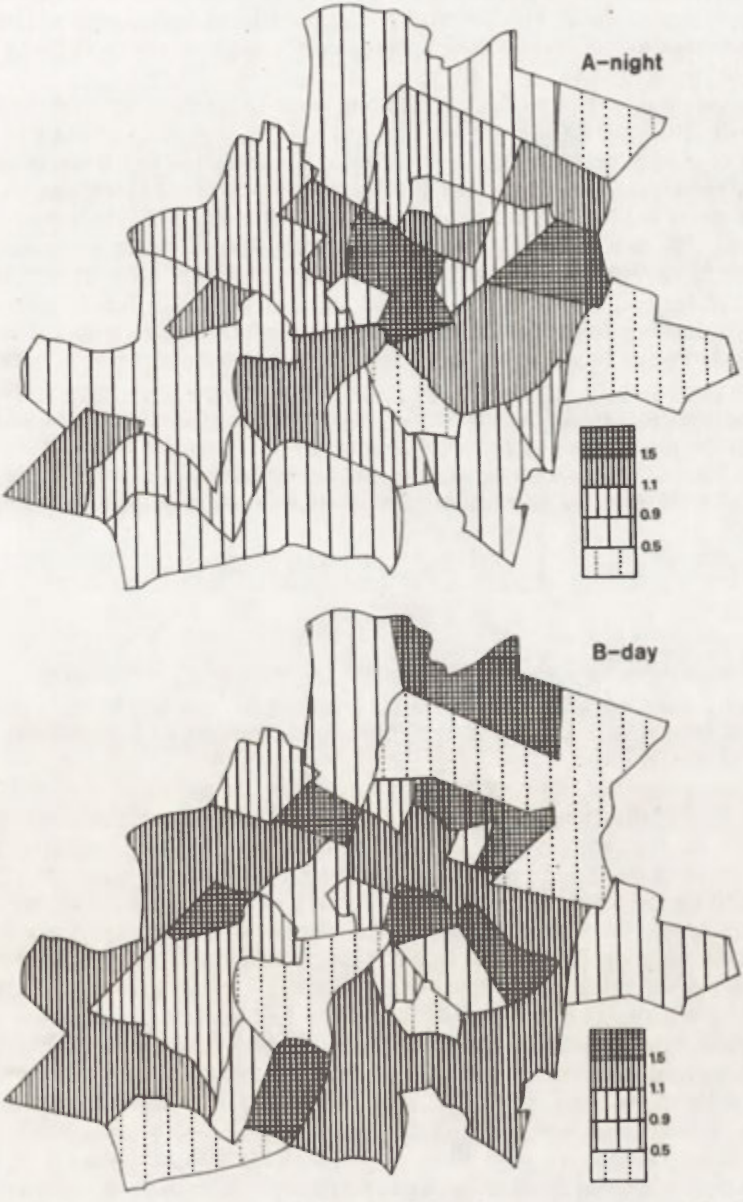

Fig. 6. Population aged 65 and over, Radom 1978 (location quotient) A — night, B — day

population numbers of 65 and more years of age in 45 town planning areas in Radom. The second data set concerned numbers of people commuting to work and to school from among all the town planning areas. These two data sets made it possible to represent the population numbers for any given town planning area considered the night and during the day (i.e. during working and school hours). It was assumed that the elderly people, of 65 and more years of age are extremely immobile and they do not leave town planning area in which they live, so that number of the elderly in a given area is constant, regardless of the time of the day. Two consecutive maps show the distribution of the elderly in relation to the total population (location quotient) depending upon the time of the day (Fig. 6). It was concluded that over-representation of the elderly during the night is the most pronounced in the central parts of town, while under-representation of this demographic group occurs in the peripheries and in housing estates (Fig. 6A).

The situation is completely different during working houres. Over-representation of elderly in downtown areas is much less pronounced, but there is a significant increase in the share of elderly people in the housing estates constructed in the sixties an in the peripheral residential areas of one-family houses. Town-planning districts in which large industrial plants are located, are characterized by a low share of elderly people during the daytime. The new housing estates of Radom, constructed in the seventies south of the center, display low shares of old people, so that even after a significant outflow of working and learning people occurs, there is still a strong under-representation of the elderly in downtown areas is much less pronounced, but there is a significant increase in "35 Years of Polish People's Republic" are, on the other hand, more "typical", since under-representation of the elderly during the night turns into over-representation during the working hours. The division of town into town-planning areas, identical of course, for the night-time and for the day-time, makes it possible to find a measurable answer to the following question: when is spatial segregation of elderly people greater?

The calculation of the segregation coefficient was accomplished according to the formula:

$$SI = \frac{\sum_{i=1}^{n} \left| \frac{Si}{S} - \frac{Li}{L} \right| 100}{2}$$

in which Si is the elderly population number, i.e. of 65 and more years of age, in the spatial unit i, S is the total number of elderly people in Radom, Li is the total population number in spatial unit i, L is the total population number in Radom, and n is the number of spatial units.

The segregation coefficient was 15.13 for the night-time data, and 20.37 for the day-time data. Thus, the quite important night-time segregation of the elderly gets even more acute during the day-time. In order to completely adjust this segregation one would have to move 15.13% of old age population of Radom to other town planning districts during the night, and as much as 20.37% of this population during the day.

Direct studies on behaviour of people inhabiting old blocks of flats confirm observations made on the basis of factor ecology. Studies of this type were started in Poland at the beginning of the sixties (Kozińska 1973). It can generally be stated that the housing situation of this population group has been undergoing a systematic deterioration. This particularly applies to the recent period, when due to the decline in new housing construction as well as low levels of repairs and modernizations, the deteritoriation of the housing situation of the elderly has accelerated, in particular since access to new housing was very limited for older people (Kozińska 1980, 1984).

Studies conducted in the years 1982 — 1983 for the old housing areas in 14 towns of Poland (Czeczerda 1986) confirm the disproportionately high share of the elderly within these areas. Most of the studied old housing areas were characterized by over 40%

share of household heads in their population. In the case of one such studied area in Katowice there were as much as 68,1% of households, in which the householder was over 60. Within the age structure of the inhabitants of these areas the population group above 60 years of age almost everywhere constituted over 20%, and in the case of an old housing area in Katowice this share went to over 40%. In the old housing areas studied, a characteristic domination of female population occures, especially in lager towns. Within the set of areas under consideration there was also a significant differentiation with regard to the average period of permanent residence of inhabitants in given area and with regard to the social status of the inhabitants.

In 1984 old flats, i.e. the ones constructed before 1945, constitued in Poland some 35 % of the total number of flats, and 32,2 % of all the flats in towns. These flats were of the lowest standard, both in geographical and in temporal cross-sections, the latter meaning comparison with flats constructed after World War II.This situation resulted from the following causes:

— natural ageing of buildings and flats;

— gradual decapitalisation of old housing, especially in towns, due to the fact that a large portion of blocks of flats are owned and run there by the local state administration bodies, which over the 40-years post-war period were short of sufficient funds maintaining and upgrading the state of technical infrastructure and equipment;

— concentration of attention of the central and local authorities on the construction of new housing estates.

The shift in the focus of attention of administrative authorities towards older housing is only a question of recent years and is, at least partially, due to the breakdown of the optimistic programme of the new housing construction all over the country. Old housing resources are treated as one of the last reserves alleviating to some degree the housing crisis. Wider modernization activities of flats — especially those located in downtown areas — often lead, as is the case in e.g. Cracow, to an inflow of the privileged population strata, while the old and local population is being pushed away into relatively worse housing conditions (Rębowska 1985).

Studies of the socio-spatial structure of towns made so far, together with the analysis reported here and the literature concerning the problems of the older age population enable the presenting of the following conclusions. The position of the older age population in the socio-spatial structure of Polish towns is shaped by two fundamental socio-economic processes. Of the greatest importance is the state housing policy, controlling access to such rare resources as good housing conditions. The contradictory trends have existed within this policy during the whole of post-war period.On the one hand, egalitarian principles should have been observed, on the other hand, the necessity often appeared of granting certain housing access privileges to the professional groups most necessary for town development. The increasing spatial segregation of old population is probably one of the indicator of the decisive predominance of the selective trend over the egalitarian one in the housing policy formation. The housing conditions of a large part of the old age population are additionally worsened by the progressing decapitalization of old blocks of flats. It is the young people, representing the professions necessary for town develpoment, that have greater opportunities for leaving such areas. The disadvantageous situation thus arising can only be reverted through a wide renovation action and through the extension of low-rent municipal housing. The second process influencing the spatial segregation of old age people is related to the preferences of population groups. Older people are characterized by less mobility and are therefore less eager to move to the new flats usually located in the peripheries. Such factors are decisive as: being used to a certain environment, stable social links and better accessibility to service and health care facilities. Locational advantage of downtown areas for old age population results also from a feeling of greater safety and of participation in the social life of the city.

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