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Population Dynamics in Poland, 1950-2050: Internal Migration and Marital Status Changes

Irena E. Kotowska

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INFORMATION ON THE PROJECT

This Polish special case study is part of the project "Social Security, Family and Household in Aging Societies," conducted at IIASA in collaboration with the Netherlands Interdisciplinary Demographic Institute (NIDI).

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WP-89-34   Recent Trends in Living Arrangements in Fourteen Industrialized Countries, by J.-P. Gonnot and B. Vukovich

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ABSTRACT

This paper reports the findings of the Polish case study in which population projections by age, marital status and region of residence have been calculated by use of the LIPRO model. That multidimensional dynamic projection model was developed at NIDI by Van Imhoff and Keilman (1991) to study population and households dynamics. The course of the demographic processes in Poland differs significantly for urban and rural subpopulations, so it was decided to apply that model to project changes in the marital composition of Poland's population by place of residence (urban/rural areas). The data necessary to run the model have been prepared using publications of the Central Statistical Office of Poland (CSO) and unpublished CSO materials.[1] Several assumptions regarding the components of population dynamics were formulated. In the scenarios, special attention was given to internal migration and its possible influence on population composition (age and marital status) and population dynamics (births, deaths, marriages and divorces).

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[1] Officially published CSO data caused many problems during the phase of input data preparation according to the model requirements, especially for urban-rural disaggregation. For instance, information on widowhood, internal migration flows by age, sex and marital status are not included in that data set. Unpublished data, prepared in the Department for Social and Demographic Research, made it possible to improve the data basis for the model.

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POPULATION DYNAMICS IN POLAND, 1950-2050: INTERNAL MIGRATION AND MARITAL STATUS CHANGES

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1. DEMOGRAPHIC TRENDS, 1950-1990

Demographic changes of Poland's population were described in the case study report by Fratczak and Jozwiak (1992). The present paper gives information on past demographic changes for urban and rural areas with special emphasis on aging and migration patterns.

Table 1 presents the basic population indicators for the period 1950-1990. The strongest growth of urban population was noticed during the 1950s, mainly because of migration from rural to urban areas.

Table 1. Reproduction indicators, 1950-1990.

Years	Population (in 1000s as of December 31)	TFR	NRR	Life Expectancy at Birth Males (in years)	Females (in years)
Poland					
1950	25035.0	3.705	1.491	58.6	64.2
1960	29795.2	2.980	1.339	64.8	70.5
1970	32657.7	2.200	1.011	66.8	73.8
1980	35734.9	2.276	1.073	66.9	75.4
1985	37341.0	2.329	1.100	66.9	75.3
1990	38183.2	2.039	0.967	66.5	75.5
Urban					
1950	9243.0	3.235	1.300	59.0	65.4
1960	14401.0	2.430	1.098	65.0	71.2
1970	17088.0	1.710	0.794	66.7	73.9
1980	20978.5	1.928	0.910	66.7	75.2
1985	22486.2	2.045	0.967	66.5	74.9
1990	23614.5	1.768	0.837	66.5	75.2
Rural					
1950	15792.0	4.030	1.610	58.3	64.3
1960	15394.2	3.600	1.601	64.7	69.9
1970	15569.7	2.885	1.315	66.9	73.6
1980	14756.4	2.908	1.368	67.0	75.8
1985	14854.8	2.817	1.331	67.3	76.0
1990	14568.7	2.483	1.179	66.5	76.0

In 1950 the urban and rural populations did not differ very much. Fertility was relatively high in rural areas; life expectancy at birth was longer for the urban population by nearly one year. The age composition showed a higher percentage of young persons in rural areas and a higher share of the working-age population in urban ones. Consequently, the old-age dependency ratio, i.e. the number of persons aged 60 and over per 100 persons between 15 and 59 years, was 2 persons higher in the rural population than in the urban one (see Table 2). Sex ratios, more balanced for the rural population, reflected to a large extent the war losses in the male population (see Table 3).

Changes in fertility and internal migration patterns as well as sex differentials in mortality caused remarkable shifts in the age-sex composition of both subpopulations. During the years 1950-1970, fertility decreased relatively strongly in urban areas. In the mid-1960s, the fertility indicators for the urban population reached values below replacement level. That decline was stopped in the late 1970s. The TFR increased for both populations, more remarkably for the urban one, because of a temporary rise in age-specific fertility rates, especially for females aged 20-29. These changes in age-specific rates were accompanied by shifts in live births by order leading to an increase in the share of the second and third births. The baby boom, observed in 1982-1984, exceeded the predicted level, which was expected as an echo of the post-war wave. After that period, the decrease in fertility started again.

The spatial differences in TFR increased till 1970, then went down nearly to the level noticed in 1950. The pattern of age-specific fertility, with the maximum in the 20-24 age group followed by relatively high fertility in the next age group, was similar in both areas. However, the timing of births and the level of age-specific fertility rates differed considerably between the urban and rural populations. These region-specific fertility changes may be generally explained by selective migration and different impacts of economic development on reproductive patterns in urban and rural regions. Labor intensive economy, together with the rapid industrialization, in which preferences were given to heavy industry, resulted in a withdrawal of the population from the labor force in rural areas, especially the male labor force. In the period 1950-1970, more than 60 per cent of labor-force migration from rural to urban areas was created by males, while in the years 1970-1988, that percentage was 27 per cent. In the beginning of the 1950s, the age groups 15-19 and 20-24 dominated for both sexes with a small predominance of the youngest migrants. Persons aged 15-29 constituted about 60 per cent of all male and female migrants to the urban region. The changes in the age composition of migrants led to a decline of this share for males to 47 per cent, and to a slight increase for females to 61 per cent in 1970. Among females, those aged 20-24 dominated remarkably (28 per cent of the female rural to urban flow).

Labor intensive economy required high female participation in the labor force. The process of female integration in employment was also ideologically supported by equating emancipation with women's employment and considering it as a real advantage offered by the new political system. In the economic policy, preferences were given to industry and generally to non-agriculture, consisting mainly of state-owned firms. Agriculture, dominated by private farms, was discriminated in investment allocation. This policy led to remarkable discrepancies in the living standard between urban and rural areas, considered in terms of economic and social conditions. Educational progress concerned mainly the urban population. The differences between the educational level of the urban and rural populations grew remarkably. For instance, in 1988 the proportion of females with at least vocational education equalled 61 per cent in urban areas, while in rural ones only 35 per cent. Consequently, socio-economic changes caused by the industrialization, i.e. changes in economic and social environment, consumption patterns, the improvement in knowledge of family planning, etc., were experienced mainly by the urban population, and influenced female attitudes towards childbearing.

Table 2. Population structure by broad-age groups and place of residence, 1950-1990, as of December 31.

Years	Both Sexes			Males				Females			
	0-14	15-59	60+	0-14	15-59	60+	Total*	0-14	15-59	60+	Total*
Poland											
1950	29.4	62.3	8.3	31.3	61.7	7.0	11942.0	27.8	62.7	9.5	13093.0
1960	33.5	56.9	9.6	35.3	56.8	7.9	14414.3	31.8	57.0	11.2	15380.9
1970	26.5	60.5	13.0	27.9	61.1	11.0	15861.5	25.2	59.9	14.9	16796.2
1980	24.4	62.4	13.2	25.6	63.6	10.8	17410.6	23.2	61.3	15.5	18324.3
1985	25.6	60.5	13.9	26.9	61.9	11.2	18211.4	24.4	59.1	16.5	19129.6
1990	24.9	60.1	15.0	26.2	61.6	12.2	18606.0	23.8	58.6	17.6	19577.2
Urban											
1950	26.3	65.7	8.0	28.5	65.1	6.4	4322.3	24.4	66.2	9.4	4920.7
1960	31.2	59.9	8.9	33.1	60.1	6.8	6922.6	29.5	59.7	10.8	7478.4
1970	23.5	64.6	11.9	25.1	65.5	9.4	8183.4	22.0	63.8	14.2	8904.6
1980	22.9	65.4	11.7	24.4	66.5	9.1	10073.3	21.5	64.3	14.2	10905.2
1985	24.7	62.8	12.5	26.4	63.9	9.7	10792.4	23.2	61.8	15.0	11693.8
1990	24.0	62.5	13.5	25.6	63.5	10.9	11335.9	22.5	61.5	16.0	12278.6
Rural											
1950	31.3	60.2	8.5	32.9	59.8	7.3	7619.7	29.9	60.6	9.5	8172.3
1960	35.7	54.1	10.2	37.4	53.7	8.9	7491.7	34.0	54.5	11.5	7902.5
1970	29.8	56.1	14.1	30.9	56.5	12.6	7678.1	28.8	55.6	15.6	7891.6
1980	26.5	58.2	15.3	27.3	59.7	13.0	7337.3	25.7	56.8	17.5	7419.1
1985	27.0	56.8	16.2	27.6	59.0	13.4	7419.0	26.3	54.7	19.0	7435.8
1990	26.5	56.1	17.4	27.2	58.5	14.3	7270.1	25.8	53.8	20.4	7298.6

* Absolute numbers in thousands = 100% for each sex

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Table 3. Old-age dependency ratio by sex and place of residence, 1950-1990.

Years	Poland			Urban			Rural		
	Total	Males	Females	Total	Males	Females	Total	Males	Females
1950	13.31	11.30	15.11	12.18	9.86	14.18	14.03	12.19	15.72
1960	16.79	13.83	19.55	14.79	11.24	18.11	18.86	16.51	21.06
1970	21.43	17.92	24.81	18.45	14.43	22.24	25.20	22.23	28.14
1980	21.18	16.93	25.37	17.97	13.72	22.04	26.29	21.85	30.92
1985	23.09	18.16	28.00	19.85	15.26	24.22	28.51	22.74	34.70
1990	24.98	19.89	30.05	21.67	17.20	25.93	30.94	24.45	37.98

Female employment in the traditional private agriculture did not compete with family duties as strongly as employment did in non-agriculture. For urban women, the replacement of the model of a male breadwinner supporting a dependent wife and children by the two-income family with a wife sharing her time between full-time employment and family responsibilities required a tight time-schedule for families and proper changes in home work division by gender. However, the wide access to paid work for women was not accompanied by proper changes in a perception of division of family duties. Together with the evident underdevelopment of infrastructure, it caused a real burden for women. The conflict between professional and family careers was deepened by a rising shortage in child-care facilities and declining possibilities of grandparents' involvement in the care for children because of their own employment. Changes in females attitudes towards childbearing and work outside the home were first observed in Poland in the 1970s. Female participation in the labor force went down--the percentage of economically active females decreased from 46.4 per cent in 1970 to 45.4 per cent in 1978 and 43.2 per cent in 1988.

New regulations on parental leaves and benefits, the rising value of a family in the time of economic and social crisis in Poland, together with the above-mentioned changes in female attitudes towards professional and family careers, affected the temporary increase in fertility during the early 1980s. The decline observed later may be considered as a continuation of the previous tendency, which was interrupted by the crisis. An importance of subjective, mainly emotional factors, prevailing economic ones at the beginning of the 1980s, declined along time. A continuous rise in living costs diminished the fertility, stimulating effects of regulations on parental leave and benefits. Since 1984 age-specific fertility rates decreased steadily, particularly for age groups 20-35. Consequently, reproduction has been below replacement level for Poland's population since 1989.

The substantial decline in mortality during the years 1950-1970, which resulted in an increase in life expectancy at birth, stopped in the 1970s. The unfavorable changes in death rates of males aged 25-60 (especially ages 35-60 in urban areas and 25-55 in the rural ones) led not only to a stabilization of male life expectancy, but even to a drop in the 1980s to a level below the one observed in the mid-1960s. The marked difference between sexes in mortality changes resulted in a growing sex gap of life expectancy and old-age dependency ratios, and also in a decline of masculinity ratios for the elderly population (see Tables 1, 2 and 3). It is worth noting that in the early 1980s, an increase in female mortality was observed, particularly in towns. One can sum up by saying that an excess male mortality has been a distinctive feature of mortality changes in Poland since the 1970s. Moreover, for the first time in the post-war period, not only life expectancy at birth for both sexes in urban areas declined, but also values of that measure in all other age groups of each sex. In the late 1980s a slight increase in female life expectancy was observed, but the recent changes in living conditions accompanied by insufficient health care services conclude that a worsening of mortality measures can be expected in the near future.

Despite the downward trend in marriage rates, observed during the years 1960-1990, and an increase in divorce rates, which stopped in the late 1980s, marriage remains an important social institution in Poland. However, these long-term tendencies illustrate changes in the marital behavior of the population, which are relatively remarkable in urban areas. These changes could be also confirmed by the decrease of the proportion of first marriages among all contracted marriages from 88.1 per cent in 1960 to 85.5 per cent in 1990, and by the upward trend in the proportion of never married males (in all age groups) and of females aged 15-29. The latter may be partly explained by shifts in the age-sex composition of the rural population, observed in two recent decades, which were caused mainly by the highly selective migration from the rural to urban areas. The stronger drop in male marriage rates than in female ones in the rural region, and the decrease in number of marriages for that population, were also affected by these unfavorable age-sex shifts. The shortage of young women in rural areas influenced strongly the intensity of the marriage formation (see Tables 4 and 5).

Table 4. Marriages per 1000 persons aged 15 and over, 1950-1990.

| Years | Males | | | Females | | |
	Total	Urban	Rural	Total	Urban	Rural
1950	32.6	-	-	37.4	-	-
1960	26.4	27.2	25.6	23.5	23.8	23.1
1970	24.5	24.3	24.7	22.3	21.5	23.3
1980	23.8	24.7	22.4	21.9	22.0	21.7
1985	20.1	20.7	19.3	18.5	18.1	19.1
1990	18.6	17.2	19.3	17.2	15.1	21.8

Table 5. Divorces per 1000 persons aged 20 and over, 1950-1990.

Years	Poland	Urban	Rural
1950	0.73	1.47	0.26
1960	0.84	1.41	0.27
1970	1.68	2.66	0.52
1980	1.65	2.34	0.61
1985	1.95	2.70	0.78
1990	1.65	2.16	0.74

The median age at marriage fluctuated slightly over the years 1960-1990. Both partners became older upon entering marriage since 1970, but more significant changes can be noticed for females, especially in rural areas. Also since 1970 newly married persons in urban regions were older than those in rural ones. This concerns females in particular, and it may be explained by the impact of such socio-economic factors as education, participation in the labor force, housing, social norms, etc.

Marriage dissolution patterns were remarkably different in the urban and rural areas as well. In 1970, nearly 70 per cent of the marriage dissolutions in urban areas was due to death of the spouse--in rural regions this figure was above 90 per cent. Urban couples were more frequently dissolved by divorce (about 32 per cent) than by wife's death (19 per cent), while for rural couples that relation was the opposite (7 per cent versus 26 per cent). The percentage of

couples in rural regions dissolved by death of the husband was relatively stable, but considerably higher than that in the urban population. The meaning of divorce for marriage dissolution in the rural population increased over time, although in 1990 the percentage of marriages dissolved by divorce was still three times higher in urban than in rural areas (see Table 6).

Table 6. Marriage dissolutions by cause, 1950-1990.

| | | Death of | | |
Years	Total (1000s)	Husband (%)	Wife (%)	Divorce (%)
Poland				
1950	105.90	60.40	29.20	10.40
1960	108.20	60.80	25.50	13.70
1970	164.20	57.00	21.90	21.10
1980	209.90	60.10	20.90	19.00
1985	229.53	58.17	20.43	21.40
1990	226.40	60.50	20.80	18.70
Urban				
1970	93.30	49.43	18.85	31.72
1980	126.60	54.26	18.99	26.75
1985	141.27	52.15	18.78	29.07
1990	138.80	55.60	19.70	24.70
Rural				
1970	70.90	67.03	26.02	6.95
1980	83.10	69.22	23.73	7.05
1985	88.00	68.02	23.16	8.82
1990	86.70	69.80	22.70	8.40

Extramarital births are not frequent in Poland--they make up about 5 per cent of all births. The described changes in nuptiality and divorce can be considered as factors limiting fertility. In the late 1980s the upward trend in divorce stopped. It is difficult to evaluate that change either as only temporary or as a turning point in the tendencies which were previously observed. It is not unlikely that the shift is temporary because usual reasons of divorce (alcoholism, no care for family, difficult housing conditions) do not become less important under the transition to a market economy.[2] The rapid decrease in household welfare, housing crisis, unemployment, uncertainty in the economic and social environment may intensify the impact these factors have on family dissolution patterns. However, new regulations regarding divorce (e.g. the possibility to be formally separated but not divorced, a new divorce procedure which is more time- and cost-consuming than the old one) could counteract the mentioned factors. Therefore the registered number of divorces could decline, despite a rising importance of family dissolution stimulants.

[2]The sample survey carried out in 1991 among persons divorced in the years 1987-1989 indicates that 40 per cent of the sample population shared their flat with other families during the marriage duration.

Remarriage patterns changed noticeably over the period considered because of the rising number of divorced persons--the proportion of remarriages by widowed and divorced persons showed a downward and an upward tendency, respectively. Males remarry more frequently than females.

The changes in marriage formation and dissolution patterns also influenced household composition. The most distinctive features of these were: the rise in the proportion of one-person households (in 1988 they constituted about 20 per cent and 14 per cent of the households in the urban and rural regions, respectively), and the upward trend in the percentage of one-parent families (in 1988 17 per cent of the urban families and 13 per cent of the rural families were headed by a single parent).

The course of demographic processes in the years 1950-1990 was remarkably affected by internal migration, especially by flows from rural to urban areas. The high spatial mobility, distinctive for the years 1950-1960, resulted in a net migration of about 400 thousand in each five-year period. That intensive movement between urban and rural areas stopped in the 1960s. Next, an increase of flows to the urban areas was observed, together with stabilized flows to the rural areas, so the surplus of migrants to towns grew steadily till 1980. The economic policy realized in the 1970s was reflected, inter alia, in a significant rise of migration to the urban areas. Due to the intensive industrialization in that decade, the total number of migrants from rural to urban areas was even 2 per cent higher than in the period 1952-1960. In the years 1970-1980 net migration to urban areas amounted to little over 2 million. The socio-economic crisis of the 1980s affected spatial mobility markedly. It decreased in absolute and relative terms. The yearly number of migrants per 1000 population dropped from 30 in 1976-1980 to 21 in 1981-1985 and reached 15 in 1990. Despite the significant decline in the flow from rural to urban areas, it still constituted 36 per cent of the total migration volume (see Table 7).

The age composition of migrants to towns changed considerably, although not equally for males and females. The share of male migrants aged 15-24 declined steadily and that of males aged 25-34 rose. This resulted in an age composition in which the age group 25-29 dominated clearly. The percentage of males aged 15-29 decreased regularly from 60 per cent in 1952 to 36 per cent in 1990. The changes in the age structure of female migrants were not so regular as those for males. In the 1970s a high mobility of women aged 15-29 was observed, in particular in the age group 20-24. In the 1980s the share of females aged 15-25 went down while that in the age group 25-29 increased. As a result the share of females aged 15-29 in the rural to urban flows decreased to 41 per cent in 1990. Females migrated at a younger age than males did. For the total volume of migration in the years 1979-1988 the sex ratios amounted to 117 and 143 females per 100 males aged 15-19 and 20-24 respectively. For ages 25-29 that indicator was 87.

The changes in the age-sex composition of rural to urban flows, especially those observed in the 1970s, caused serious distortions in the distribution of population by age and sex. Additionally, migration selectivity by regions of outflow and inflow led to depopulation of certain rural regions.

Migration patterns by marital status were almost stable over the period under consideration. Single and married persons constituted about 90 per cent of migration flows from rural to urban areas and about 97 per cent of the flows in the opposite direction. Shifts in the age groups 15-29, described above, were accompanied by a steady increase in the percentage of migrants aged 0-9. This relatively high share of migrating young children together with a percentage of married migrants of about 52 per cent in the flows from the rural to urban areas indicate that family migration was an important component of that movement. In the 1980s the number of married female migrants was only 6 per cent higher than that for married male

migrants. There were small sex differences in migration composition by marital status - widows more frequently participated in migration than widowers.

Poland was an outmigration country. During the years 1952-1990 the net outmigration equalled about 754 thousand persons which gives an average annual outmigration rate of 0.9 per thousand of the population. Sixty nine per cent of the emigration came from urban regions. The urban emigration exceeded the rural one in absolute and relative terms (see Table 7).

Table 7. Average annual migration between and within urban and rural areas, 1950-1990.

Years/ Region of Destination	Region of Origin (in 1000s)			Region of Origin (per thousand persons)		
	Urban	Rural	Abroad	Urban	Rural	Abroad
Urban						
1952-1990	9355.4	11138.7	210.0	13.7	16.4	0.3
1952-1960	3129.0	3063.0	167.7	28.3	27.7	1.5
1961-1965	1128.7	1303.8	8.5	15.0	17.4	0.1
1966-1970	947.0	1265.4	6.8	11.6	15.4	0.1
1971-1975	1009.3	1455.7	6.0	11.2	16.2	0.1
1976-1980	1313.4	1682.3	6.6	13.1	16.7	0.0
1981-1985	1005.9	1263.9	5.5	9.4	11.8	0.0
1986-1990	822.1	1104.6	8.9	7.2	9.6	0.1
1989	161.5	221.8	1.9	7.0	9.7	0.1
1990	149.4	196.6	2.2	6.4	8.5	0.1
Rural						
1952-1990	5769.8	11085.7	123.0	9.7	18.6	0.2
1952-1960	2244.1	3915.1	107.4	16.1	28.1	0.8
1961-1965	800.9	1797.3	5.4	10.2	22.9	0.1
1966-1970	567.7	1544.2	3.6	7.2	19.5	0.0
1971-1975	517.5	1288.4	2.2	6.7	16.7	0.1
1976-1980	615.1	1051.3	1.5	8.3	14.1	0.0
1981-1985	578.2	812.8	1.2	7.7	10.7	0.0
1986-1990	446.3	676.6	1.7	6.0	9.1	0.0
1989	82.0	131.2	0.3	5.5	8.8	0.0
1990	83.9	100.0	0.4	5.6	6.7	0.0
Abroad						
1952-1990	749.5	337.1	-	1.1	0.5	-
1952-1960	247.1	123.3	-	2.2	0.9	-
1961-1965	71.7	47.8	-	0.9	0.6	-
1966-1970	71.5	32.8	-	0.9	0.4	-
1971-1975	55.8	27.9	-	0.6	0.4	-
1976-1980	85.8	56.2	-	0.8	0.8	-
1981-1985	97.0	23.0	-	0.9	0.3	-
1986-1990	120.6	26.1	-	1.0	0.3	-
1989	20.3	6.3	-	0.9	0.4	-
1990	14.8	3.6	-	0.7	0.2	-

The aging process of the Polish population was characterized by a steady decrease in the share of people aged 0-14 (with the exception of 1960 and 1990) and a regular rise in the number and the share of people aged 60 and over (see Table 2). In 1950-1960 aging occurred mainly at the top of the pyramid: the improvement in mortality was accompanied by the post-war baby boom. Between 1960 and 1970 aging was reflected by changes at the bottom because of the fertility decline. The aging at the bottom was stopped by the fertility increase in the next years. Simultaneously, the relatively small cohorts entered the aged population. The share of the elderly (60 and over) in the total population went up by only 2 per cent in the period 1970-1980. The drop in fertility, observed after 1984, caused the share of the total elderly population to rise by 13 per cent during the period 1980-1990.

Changes in the number of elderly people differed strongly between urban and rural areas. The increase in the number of elderly was remarkably strong in the urban areas: the urban elderly population increased by 332 per cent between 1950 and 1990, and the rural one by 90 per cent. The strongest rise in the number of urban elderly took place in the period 1950-1960 (by 73 per cent); for the rural aged population, the strongest growth was noticed in the years 1960-1970 (by 40 per cent). In 1990 about 56 per cent of persons aged 60 and over lived in urban areas, whereas in 1950 this share was 36 per cent.

Data given in Table 3 confirm the growing sex and spatial differentiation of the aging process during the period under consideration. In 1950, the old-age dependency ratio (OADR) for the rural population was 15 per cent higher than for the urban population. In 1990 it was 43 per cent higher because its increase since 1950 had been remarkably strong (by 120 per cent) compared to the rise in the urban ratio (by 78 per cent). Changes in sex-specific age-dependency ratios deepened spatial discrepancies. In 1990 the relation between the elderly females and females aged 15-59 in rural areas was 46 per cent higher than in urban ones (in 1950 the difference was only 11 per cent). The male ratio was 42 per cent higher (in 1950 only 24 per cent). The demographic burden of the rural working-age population and its sex differentials are so high that this may cause a real threat to the living standard of the rural population created under the centrally planned economy and affected negatively by the transition to the market economy.

2. FORMULATION OF THE LIPRO MODEL FOR THE REGIONAL AND MARITAL STATUS PROJECTIONS

The overview of past demographic trends in Poland showed that spatial differentials, especially in fertility and marriage dissolution, were rather marked. Together with a high selectivity of internal migration by age and sex, it resulted in noticeable differences of population structures by age, sex, and marital status in urban and rural regions. Therefore, population dynamics components with spatial cross-sections have to be included in studies on the future development of the population. We focus on changes in population composition by marital status. That extension of population projections allows not only a deeper insight into demographic structures but also provides information on changes in living arrangements, useful for social policy. For that purpose the model named LIPRO (LIfestyle PROjections) seems to be an adequate device.

The dynamic household projection model LIPRO belongs to the class of multidimensional projection models which can be applied in a wide range of fields. The methodology has been presented in detail in the book by Van Imhoff and Keilman (1991) and thus the technical description of the model is omitted here.

The regional-marital status version of the LIPRO model describes changes in the population broken down by age, sex, region (urban-rural), and marital position. The state vector describes the population composition at any point in time. Its elements consist of the number of individuals of a given age, sex, and region who are in a particular marital position. The state vector changes over time as a result of the following events: births, deaths, marriages, divorces and internal migrations. In the model the following marital positions have been distinguished:

1. single (never married),
2. married,
3. widowed,
4. divorced.

Table 8 presents possible events in the model under the assumption that an individual cannot change marital status and place of residence simultaneously. International migration is omitted in the model.

Table 8. Classification of marital events in the model with internal migration.

Status before event	Marital status after event								
	1	2	3	4	5	6	7	8	Dead
1. Single, urban	-	1	*	*	2	*	*	*	3
2. Married, urban	*	-	4	5	*	6	*	*	7
3. Widowed, urban	*	8	-	*	*	*	9	*	10
4. Divorced, urban	*	11	*	-	*	*	*	12	13
5. Single, rural	14	*	*	*	-	15	*	*	16
6. Married, rural	*	17	*	*	*	-	18	19	20
7. Widowed, rural	*	*	21	*	*	22	-	*	23
8. Divorced, rural	*	*	*	*	*	25	*	-	26
Not yet born, urban	27	*	*	*	*	*	*	*	*
Not yet born, rural	*	*	*	*	28	*	*	*	*

* impossible event
- no event

For projection of the age-sex-marital composition of the urban and rural populations in Poland, the exponential version of the LIPRO model with a consistency algorithm has been used. This version assumes that intensities for all events identified in the model are constant during the unit projection interval (see for details Van Imhoff and Keilman, 1991). The consistency algorithm deals with the well known two-sex problem. To ensure the proper correspondence between numbers of entries and exits in marital positions, possible relations between events have to be traced. The consistency relations used in the algorithm are the following:

- the requirement for marriage: the total number of male marriages (summed over all ages and previous marital statuses) equals the total number of female marriages for the urban and rural subpopulations separately;
- the requirement for divorce: the total number of male divorces (summed over all ages) equals the total number of female divorces, both for the urban and rural subpopulations;
- the requirement for widowhood: the total number of deaths of married males (summed over all ages) equals the total number of females who become widows, both for the urban and rural subpopulations (and likewise for the sexes interchanged);

- the requirement for migration of couples: the total number of married females (summed over all ages) who move from urban to rural areas equals the total number of married males who migrate from the urban to the rural region; the same relation concerns married females and married males who migrate from rural to urban areas.

Another assumption, applied in the model, is that "cross-regional" marriages do not occur. In other words, urban and rural regions are two separate marriage markets.

The consistency algorithm distinguishes active and passive events. In the requirements for widowhood, entries into widowhood are specified as being "passive", while deaths are "active". This leads to a mortality dominant approach to these consistency requirements and therefore the number of widows is adjusted to the number of married male deaths, and likewise for the two sexes interchanged. The harmonic-mean solution has been used for adjusting numbers of inconsistent events.

It has been assumed that partners cannot migrate separately. The overview of data for the years 1980-1985 showed that the total flows of married males and females were roughly equal. Projection results with and without that requirement differed relatively little. Differences in age-sex-marital status composition of both subpopulations did not exceed 5 per cent in general; only in a few cases (divorced females and males aged 15-19) they were about 7 per cent. Migration flows to the urban region, projected without the requirement of joint migration of partners, were generally slightly smaller, and those to rural areas generally slightly higher. There were no systematic changes over time in these errors. Thus it was decided to maintain the requirement for migration of couples in the model.

The input data necessary to run the model include information on the urban and rural population by age, sex and marital status; on numbers of births, deaths, marriages, and divorces, all of these by age, sex and marital status for the urban and rural populations; as well as on migration by age, sex and marital status. These data for each of the years 1980-1985 in five-year age groups have been prepared using CSO publications and unpublished CSO materials, especially data prepared by K. Latuch in the Department for Social and Demographic Research. These unpublished data were obtained from the 1978 census on population and current registration of demographic events. The reliability of data on internal migration for the elderly (70 and over) may be questioned. The same concerns data on external migration. External outflows were understated in official statistics which implies that the size of the population could be overestimated. The selectivity of migration by urban-rural regions and age may also have caused an overestimation of some age groups, especially in the urban region.

To prepare data for the model input, some assumptions had to be considered. Unfortunately, the available birth statistics do not distinguish marital status of the mother. It has been assumed that 95 per cent of births could be attributed to married mothers, and 5 per cent to single mothers. This implies that the fertility rates of divorcees and widows are zero. This way the number of possible events was reduced from 34 identified in Table 8 to 30. Data on events according to age, sex and spatial disaggregation, mostly of the age-period type, were transformed into cohort-period data. For projection purposes the initial population was the population of Poland as of 31 December 1985.

The LIPRO model has been applied under four scenarios: two benchmark scenarios and two migration scenarios. These can be briefly summarized as follows:

1. two benchmark scenarios assume stable fertility, mortality, nuptiality and divorce patterns (at the 1981-1985 level). One of them does not include internal migration (zero-migration

scenario - B0), the second one (scenario BM) keeps migration at the level as observed in the years 1981-1985. Therefore differences between them express the impact of internal migration only;

2. two migration scenarios consider different courses of internal migration only. Migration scenario 1 (scenario M1) adopts several assumptions on the further decrease in spatial mobility. They are based on age-sex patterns observed during the years 1980-1985. In migration scenario 2 (scenario M2) a decrease in the spatial movement for the years 1986-1990 is stopped in the period 1991-1995, and a slight increase is assumed for the years thereafter. The other population dynamics components are in both scenarios as observed in the years 1981-1985. Therefore differences in projection results reflect an impact of changes in the spatial mobility.

A detailed description of the applied projection scenarios is given in the Appendix.

Assumptions on migration rates are specified by regions according to trends observed recently and their expected changes for the years 1986-2000. The first set of migration assumptions, included in the M1 scenario, assumes a continuation of the decline in age-sex-marital status migrations rates observed in 1980-1985. Recent developments in Poland, like increasing housing difficulties, experienced mainly by the population living in the urban region, and the labor market situation (currently the unemployment rate is markedly higher in the urban region), may be considered as factors causing a further decrease in spatial mobility. However, some counterfactors should be also taken into account. The growing spatial differentials in the labor market, together with unemployment composition by age (persons aged below 35 constitute 64 per cent of unemployment) could affect the spatial movement also. The M2 scenario reflects a situation in which these factors determine the mobility increase.

3. SELECTED PROJECTION RESULTS

In the brief overview of projection results, emphasis will be put on the aging process as well as on changes in the marital status composition by sex and region. The impact of scenario assumptions is considered also in terms of events: births, deaths, marriages, divorces and migrations. In our discussion the BM scenario is usually taken into account as a point of reference. The impact of internal migration can be evaluated by use of the following scheme:

- the B0 scenario versus the BM scenario,
- the BM scenario versus the migration scenarios (M1 and M2)--it facilitates an evaluation of the influence of different changes in migration patterns.

Our discussion regards mainly changes in the urban and rural projections.

3.1. The Benchmark Scenarios

The sizes of the total population projected by the BM and B0 scenarios do not differ significantly. The steady increase, expected under both scenarios, leads to a population size in 2046 slightly lower for the BM scenario (by about 2 per cent). Marked differences in the population size are foreseen for the urban and rural regions (see Table 9). The proportion of people living in the urban areas would increase from 60 per cent in 1986 to 68 per cent in 2046 under the BM scenario, while under the B0 scenario a decrease to 49 per cent is predicted.

Table 9. Population composition by broad age groups.

Years	0-14 (%)	15-59 (%)	60+ (%)	Total (=100%) (1000s)	0-14 (%)	15-59 (%)	60+ (%)	Total (=100%) (1000s)
	Benchmark Scenarios: Without Migration				With Migration			
Poland								
1986	25.6	60.5	13.9	37341.0	25.6	60.5	13.9	37341.0
2001	23.9	60.8	15.3	41339.7	24.0	60.6	15.4	41425.8
2016	24.5	58.5	17.0	45424.5	24.2	58.6	17.2	45404.6
2031	24.4	58.7	16.9	49415.4	23.9	59.0	17.1	49046.2
2046	24.8	58.5	16.7	53667.6	24.1	58.9	17.0	52647.5
Urban								
1986	24.7	62.8	12.5	22486.2	24.7	62.8	12.5	22486.2
2001	21.4	63.5	15.1	24271.3	22.1	63.5	14.4	26480.6
2016	21.7	58.9	19.4	25520.9	22.3	60.4	17.3	30118.3
2031	21.3	59.3	19.4	25963.8	21.9	60.7	17.4	33178.6
2046	21.8	58.8	19.4	26163.0	22.1	60.4	17.5	36045.3
Rural								
1986	27.0	56.8	16.2	14854.8	27.0	56.8	16.2	14854.8
2001	27.5	56.9	15.6	17068.4	27.2	55.5	17.3	14945.2
2016	28.1	58.0	13.9	19903.6	28.1	55.0	16.9	15286.4
2031	27.8	58.1	14.1	23451.6	28.2	55.4	16.4	15867.6
2046	27.7	58.2	14.1	27504.6	28.6	55.6	15.8	16602.2
	Migration Scenarios: Migration 1				Migration 2			
Poland								
2001	24.1	60.5	15.4	41493.6	24.1	60.5	15.4	41473.9
2016	24.5	58.4	17.1	45652.1	24.4	58.5	17.1	45557.1
2031	24.4	58.7	16.9	49658.5	24.1	58.9	17.0	49397.0
2046	24.7	58.7	16.6	53844.0	24.4	58.8	16.8	53298.4
Urban								
2001	21.5	63.7	14.8	25715.5	21.8	63.6	14.6	25998.1
2016	21.6	60.1	18.3	28463.5	22.0	60.2	17.8	29263.3
2031	21.3	60.3	18.4	30783.9	21.7	60.5	17.8	32052.3
2046	21.7	60.1	18.2	33123.9	22.0	60.2	17.8	34769.1
Rural								
2001	28.3	55.3	16.4	15778.1	27.9	55.4	16.7	15475.8
2016	29.3	55.7	15.0	17188.6	28.6	55.5	15.9	16293.8
2031	29.3	56.3	14.4	18874.6	28.7	55.8	15.5	17344.8
2046	29.4	56.5	14.1	20720.1	29.0	56.0	15.0	18529.3

Stopping migration between urban and rural regions results in a rapid increase in the size of the rural population in all age groups. The changes in the urban age subgroups are characterized by a slight rise in the youngest group, a stabilization of the urban working-age population, and a marked rise of the elderly. There are considerable differences between the B0 and BM scenarios when it comes to the size of the young population, although its share is nearly

the same. The share of the rural working-age population is hardly influenced by migration contrary to the share of the elderly.

The sensitivity of the aging process on internal migration can be demonstrated by changes in the old-age dependency ratios (see Table 10). They show that the urban and rural populations would experience quite different courses of aging. Under the B0 scenario the large discrepancy between these populations with respect to the OADR could gradually decline till 2001. Next, it could start to rise rapidly because of the intensive aging of the urban population. Between the years 2001-2016 the aging indicators increase by 38 per cent and 45 per cent for males and females, respectively. On the other hand, the high values of the ratios, observed for the rural population in 1986, would slightly diminish till 2001, and next a marked drop could be expected. This results in substantial changes in the spatial differentials of the aging process in the period 2001-2016 which lead to a reversal of the relation between the intensity of aging compared to that observed previously.

Table 10. Old age dependency ratio by sex and place of residence for projected populations.

Years	Poland Total	Males	Females	Urban Total	Males	Females	Rural Total	Males	Females
Benchmark scenario without migration									
1986	23.09	18.17	28.00	19.86	15.27	24.24	28.50	22.74	34.69
2001	25.28	20.19	30.40	23.88	19.10	28.50	27.37	21.65	33.47
2016	29.35	23.98	34.74	33.05	26.39	39.62	23.99	20.33	27.76
2031	29.15	23.46	34.86	32.77	24.92	40.64	24.37	21.14	27.61
2046	28.93	23.48	34.41	32.96	26.09	39.86	24.20	20.15	28.27
Benchmark scenario with migration									
2001	25.42	20.29	30.57	22.62	18.18	26.88	31.11	24.30	38.60
2016	29.33	23.91	34.77	28.69	23.43	33.76	30.71	24.88	37.12
2031	29.01	23.27	34.78	28.70	22.85	34.36	29.72	24.16	35.80
2046	28.85	23.32	34.41	29.07	23.44	34.52	28.34	23.05	34.13
Migration 1									
2001	25.42	20.29	30.58	23.22	18.59	27.70	29.55	23.32	36.28
2016	29.26	23.85	34.69	30.52	24.73	36.16	27.00	22.33	31.94
2031	28.79	23.09	34.52	30.55	24.05	36.92	25.72	21.48	30.17
2046	28.38	22.95	33.85	30.36	24.38	36.21	25.03	20.60	29.69
Migration 2									
2001	25.42	20.29	30.58	23.00	18.44	27.39	30.10	23.65	37.11
2016	29.28	23.86	34.71	29.63	24.11	34.99	28.58	23.41	34.14
2031	28.88	23.16	34.62	29.41	23.28	35.36	27.83	22.93	33.08
2046	28.58	23.11	34.08	29.49	23.75	35.07	26.75	21.88	31.99

Including internal migration causes changes in the predicted course of the aging process, especially for the rural population. The tendency of expected shifts in the urban old-age dependency ratios does not differ much from that foreseen under the B0 scenario (see Table 10). However the changes are less intensive, particularly till 2016. The ratios obtained for the last

prediction period are 3-5 percentage points lower. The intensive course of the aging of the rural population, observed in the past, would be continued till 2001, and next a slight and steady decrease in the OADR may be expected. Together with the rapid aging of the urban population, this leads to nearly the same OADR values for the urban and rural populations after 2031, i.e. 29 persons. The shifts in the age-sex distribution caused by the scenario assumptions are also reflected in changes of sex ratios (see Table 11).

Table 11. Sex ratios for projected populations.

Years	Urban		Rural	
	15-59	60+	15-59	60+
Benchmark scenario without migration				
1986	0.954	0.601	1.075	0.705
2001	0.967	0.648	1.067	0.690
2016	0.986	0.657	1.030	0.754
2031	1.003	0.615	1.006	0.770
2046	1.004	0.657	1.007	0.718
Benchmark scenario with migration				
2001	0.961	0.650	1.100	0.692
2016	0.964	0.669	1.097	0.735
2031	0.967	0.643	1.093	0.738
2046	0.969	0.658	1.095	0.740
Migration 1				
2001	0.967	0.649	1.080	0.694
2016	0.975	0.667	1.059	0.740
2031	0.979	0.638	1.049	0.747
2046	0.978	0.658	1.054	0.731
Migration 2				
2001	0.964	0.649	1.088	0.693
2016	0.969	0.668	1.077	0.738
2031	0.972	0.640	1.071	0.742
2046	0.972	0.658	1.074	0.735

Parallel to the process of aging, differences in composition by marital status with respect to the spatial disaggregation, and different changes in that composition over time may be noticed. For the year 1986, one observes a relatively high proportion of married and widowed rural women as well as a percentage of divorced urban females which is remarkably higher than the rural one (see Table 12). The markedly different rise in the share of widows in urban regions under the B0 and BM scenarios results mainly from differences in aging and changes in sex proportion for persons aged 60 and over caused by migration. For the BM projections, the shares of widows in the two populations do not cross--the rural share remains higher during the whole period. Next, the percentage currently not married in the urban female subpopulation grows from 38 per cent to 42 per cent, mainly because of the increase in the share of divorced and widowed women. That proportion declined from 36 per cent and 34 per cent for the rural females. However, the share of rural women experiencing divorce doubles.

Table 12. Marital composition of population aged 15 and over, per cent.

Years	Poland				Urban				Rural			
	Sing	Marr	Widow	Divorc	Sing	Marr	Widow	Divorc	Sing	Marr	Widow	Divorc

Benchmark scenario without migration
Females

1986	18.6	63.5	14.4	3.6	19.4	62.4	13.3	4.9	17.2	65.3	16.1	1.4
2001	18.9	61.7	14.5	4.9	20.1	59.4	13.8	6.7	17.2	65.1	15.7	2.0
2016	17.5	61.9	15.2	5.5	17.8	59.1	15.7	7.4	17.2	66.0	14.4	2.4
2031	17.7	60.7	16.1	5.6	18.0	57.2	17.4	7.3	17.4	65.7	14.3	2.6
2046	17.7	61.0	15.8	5.5	18.0	57.9	17.0	7.2	17.5	65.6	14.3	2.6

Males

1986	26.4	68.6	2.6	2.4	24.2	70.2	2.4	3.3	29.6	66.3	3.0	1.1
2001	27.8	66.3	2.8	3.0	27.2	66.0	2.7	4.0	28.9	66.7	3.0	1.4
2016	27.0	66.7	3.1	3.1	26.4	66.0	3.3	4.2	27.8	67.8	2.8	1.5
2031	27.7	65.8	3.4	3.1	28.0	64.0	3.7	4.2	27.0	68.7	2.9	1.5
2046	27.9	65.9	3.1	3.1	28.6	63.7	3.4	4.3	26.4	69.3	2.8	1.5

Benchmark scenario with migration
Females

2001	19.5	61.1	14.5	5.0	20.7	59.6	13.2	6.5	17.1	63.9	17.0	1.9
2016	18.4	60.9	15.2	5.6	19.2	59.3	14.4	7.1	16.6	64.4	16.8	2.2
2031	18.8	59.6	16.0	5.7	19.5	57.8	15.6	7.1	17.0	63.7	17.0	2.3
2046	18.8	59.8	15.7	5.7	19.5	58.1	15.4	7.1	17.2	64.1	16.4	2.3

Males

2001	28.4	65.7	2.8	3.0	27.1	66.4	2.6	3.9	30.7	64.5	3.2	1.5
2016	28.0	65.7	3.1	3.2	26.6	66.4	3.0	4.0	30.9	64.1	3.3	1.6
2031	28.8	64.6	3.3	3.2	27.6	65.2	3.3	4.0	31.5	63.5	3.4	1.7
2046	29.0	64.7	3.1	3.3	27.8	65.2	3.1	4.0	31.6	63.6	3.1	1.7

Migration 1
Females

2001	19.4	61.1	14.5	4.9	20.5	59.4	13.5	6.6	17.5	64.3	16.3	1.9
2016	18.4	61.0	15.1	5.5	18.6	59.2	15.0	7.2	18.0	64.5	15.3	2.1
2031	18.7	59.9	15.9	5.5	18.9	57.6	16.3	7.2	18.5	64.2	15.1	2.2
2046	18.8	60.3	15.5	5.4	19.0	58.0	16.0	7.1	18.6	64.6	14.6	2.2

Males

2001	28.4	65.8	2.8	3.0	27.5	66.0	2.7	3.9	29.9	65.5	3.1	1.5
2016	27.9	65.8	3.1	3.1	26.7	66.1	3.2	4.0	29.9	65.5	3.0	1.6
2031	28.6	65.0	3.3	3.1	27.8	64.7	3.4	4.0	30.0	65.4	3.0	1.6
2046	28.7	65.1	3.1	3.1	28.0	64.7	3.2	4.0	29.9	65.7	2.8	1.6

Migration 2
Females

2001	19.4	61.1	14.5	4.9	20.5	59.5	13.4	6.5	17.4	64.1	16.6	1.9
2016	18.4	61.0	15.1	5.5	18.9	59.3	14.7	7.1	17.4	64.5	16.0	2.2
2031	18.7	59.7	15.9	5.6	19.2	57.7	15.9	7.2	17.7	64.0	16.0	2.2
2046	18.8	60.1	15.6	5.5	19.3	58.1	15.6	7.1	17.8	64.4	15.6	2.2

Males

2001	28.4	65.8	2.8	3.0	27.3	66.2	2.7	3.9	30.3	65.1	3.1	1.5
2016	27.9	65.8	3.1	3.2	26.6	66.3	3.1	4.0	30.4	64.8	3.2	1.6
2031	28.7	64.8	3.3	3.2	27.7	65.0	3.3	4.0	30.7	64.4	3.2	1.6
2046	28.9	64.9	3.1	3.2	27.9	65.0	3.1	4.0	30.8	64.6	3.0	1.7

The marital composition of males is characterized by a relatively high proportion of single and married men. For rural areas one notices, at least for the period until 2016, a high proportion of single men and a low percentage of divorced men. A continuation of changes observed in the period 1981-1985 would result in the following shifts: the share of single men rises slightly and the proportion of divorced increases remarkably in urban and rural areas. These expected changes go together with a drop in the share of married males. Therefore, the proportion of men who are currently not married increases from 30 per cent in 1986 to 35 per cent in 2046 in the urban areas, and in rural areas it goes up from 34 per cent to 36 per cent.

Table 13. Marital composition of the population aged 60 and over, per cent.

Years	Total*				Urban				Rural			
	Sing	Marr	Widow	Divorc	Sing	Marr	Widow	Divorc	Sing	Marr	Widow	Divorc
Benchmark scenario without migration												
Females												
1986	6.93	39.82	50.55	2.70	7.92	36.90	51.14	4.04	5.70	43.44	49.82	1.04
2001	4.31	41.35	48.84	5.49	4.88	39.47	47.69	7.97	3.54	43.40	50.93	2.13
2016	3.60	42.58	46.30	7.52	4.21	41.18	44.50	10.12	2.53	43.82	50.26	3.40
2031	3.10	38.91	49.96	8.03	4.44	35.35	49.93	10.28	1.17	44.48	50.28	4.07
2046	3.13	39.87	49.03	7.97	4.69	36.43	48.90	9.99	1.06	45.29	49.44	4.21
Males												
1986	2.67	82.00	13.18	2.15	2.32	81.38	13.19	3.12	3.04	82.65	13.18	1.12
2001	3.28	80.00	13.44	3.29	2.62	79.78	13.12	4.49	4.17	80.01	13.92	1.90
2016	4.53	78.58	12.96	3.93	3.24	78.60	12.90	5.26	6.80	77.59	13.17	2.44
2031	4.91	76.65	14.51	3.93	4.49	74.90	15.38	5.23	5.47	78.74	13.28	2.51
2046	5.17	77.39	13.40	4.04	5.87	75.22	13.55	5.36	4.03	80.01	13.37	2.59
Benchmark scenario with migration												
Females												
2001	4.35	41.33	48.80	5.52	4.97	39.38	47.84	7.81	3.42	44.28	50.25	2.05
2016	3.66	42.17	46.39	7.78	4.24	41.04	44.67	10.05	2.43	44.55	50.00	3.02
2031	3.61	38.19	49.92	8.28	4.38	36.42	48.86	10.35	1.83	42.33	52.42	3.43
2046	4.03	38.90	48.81	8.26	4.85	37.30	47.70	10.16	1.96	42.96	51.62	3.46
Males												
2001	3.32	79.98	13.35	3.35	3.26	79.33	13.04	4.37	3.40	80.91	13.79	1.91
2016	4.65	78.27	12.89	4.18	4.20	78.29	12.50	5.01	5.51	78.24	13.65	2.60
2031	5.47	76.01	14.30	4.23	5.36	75.53	14.21	4.91	5.69	76.99	14.48	2.84
2046	5.96	76.45	13.20	4.39	5.97	75.98	13.04	5.00	5.93	77.49	13.57	3.02
Migration 1												
Females												
2001	4.35	41.34	48.79	5.52	4.96	39.43	47.80	7.81	3.43	44.22	50.30	2.05
2016	3.65	42.22	46.35	7.77	4.23	41.18	44.58	10.02	2.45	44.42	50.09	3.03
2031	3.55	38.45	49.86	8.15	4.33	36.28	49.11	10.28	1.81	43.25	51.50	3.44
2046	3.85	39.43	48.77	7.94	4.76	37.05	48.16	10.04	1.91	44.57	50.08	3.44
Males												
2001	3.32	79.98	13.35	3.35	3.27	79.28	13.07	4.38	3.39	80.97	13.74	1.90
2016	4.64	78.25	12.91	4.20	4.22	78.11	12.60	5.06	5.43	78.51	13.50	2.56
2031	5.41	76.07	14.33	4.19	5.51	75.04	14.48	4.97	5.24	78.03	14.03	2.70
2046	5.84	76.59	13.28	4.29	6.30	75.43	13.21	5.06	4.94	78.85	13.42	2.78
Migration 2												
Females												
2001	4.35	41.34	48.79	5.52	4.96	39.41	47.81	7.81	3.42	44.24	50.28	2.05
2016	3.66	42.20	46.37	7.77	4.23	41.12	44.62	10.03	2.45	44.47	50.06	3.03
2031	3.57	38.34	49.90	8.19	4.35	36.32	49.03	10.31	1.81	42.90	51.86	3.43
2046	3.93	39.17	48.80	8.10	4.79	37.23	47.88	10.10	1.92	43.67	50.96	3.45
Males												
2001	3.32	79.98	13.35	3.35	3.27	79.29	13.06	4.38	3.39	80.95	13.76	1.90
2016	4.64	78.27	12.90	4.19	4.21	78.19	12.56	5.04	5.46	78.40	13.56	2.58
2031	5.43	76.07	14.31	4.19	5.43	75.27	14.36	4.93	5.41	77.62	14.21	2.76
2046	5.87	76.55	13.24	4.33	6.11	75.75	13.11	5.03	5.39	78.19	13.52	2.89

* Values obtained from the aggregated output of urban/rural projections.

The sex differences in the marital composition by regions are characterized by a relatively high percentage of single males, and a noticeably high share of widows in both populations. The share of married males is relatively high in the urban population, while in the rural one it is close to the share of married females. This implies that in urban regions the proportion of females who are currently not married is higher than that of males. This can be explained not only by different marriage patterns, but also by a male surplus at rural marriage markets.

Differences in marital compositions predicted under the B0 and BM scenarios are not so remarkable as those noticed for the aging process. They are relatively strong for the rural

population. Contrary to the tendencies expected under the BM scenario for that region, a drop in male proportion of single and an increase in that of married males are foreseen by use of the B0 scenario. As a result, the percentage of men who are currently not married decreases from 34 per cent to 30 per cent, whereas it rises under the BM scenario. Together with differences between the scenarios in sex ratios for the population aged 15-59, this indicates that migration could be considered as a factor limiting marriage formation in rural areas.

The remarkably high percentage of rural married women in 1986 (four percentage points higher than in urban areas), the lower proportion of single and, particularly, of divorced women illustrate regional differences in marital composition of the elderly females (see Table 13). Contrary to women, the marital status structure of the elderly males does not differ between urban and rural regions.

The impact of migration on the marital composition of the elderly is visible only for the rural population. Under the B0 scenario the share of married females and males grows in the long term, whereas it falls under the BM scenario.

3.2. The Migration Scenarios

Projections under these scenarios will be discussed in terms of changes in population compositions and number of events.

The sensitivity of population growth on migration assumptions is confirmed by results obtained under the migration scenarios. The slight changes in spatial mobility, assumed in the M2 scenario, modify population growth in both regions in the medium and long term. Generally speaking, the different migration assumptions in migration scenarios influence markedly changes in the size of the population subgroups distinguished here (see Table 9).

Changes in the age composition by regions, predicted under these scenarios and compared with the BM scenario, may be summarized as follows.

- The share of the young population is almost stable for the urban areas, whereas it goes up for the rural ones, both in the benchmark and migration scenarios. The different changes in spatial mobility, adopted in the migration scenarios, affect slightly the share for the rural population.
- The decline in the share of the urban working-age population is predicted under all scenarios, but the decreases differ by scenario, especially in the medium term. The changes in the rural working-age population are more sensitive to the scenario assumptions: instead of a stable pattern foreseen under the BM scenario, a slight rise is expected under both migration scenarios. However, the differences in the predicted values between the scenarios are not so remarkable as those for the shares of the young population.
- The migration changes, applied in the migration scenarios, intensify the aging process, as measured by the old-age dependency ratios, of the urban population, and they stop it in the rural region. However, the values obtained under the two migration scenarios do not differ significantly. The most marked rise in the OADR is predicted for the urban areas in the years 2001-2016 under all scenarios. The old-age dependency ratios show also that Poland's urban population will experience intensive aging regardless of the scenarios (see Table 10).
- Changes in the OADR are remarkably stronger for the rural than for the urban population. The general course of the process is similar under all scenarios. The assumptions of the M1 scenario result in more intensive aging in the urban region and less intensive in the rural region than predicted under the BM scenario. The migration pattern adopted in the M2

scenario leads to lower values of the urban OADR, close to those obtained under the BM scenario. It intensifies the aging process for the rural population, but the OADR is still lower than under the BM scenario.

The marital composition of the urban population predicted by the migration scenarios is close to that obtained under the BM scenario. For the rural population only slight differences can be noticed, especially in the case of low spatial mobility assumed in the M1 scenario. The marital composition of the elderly is generally not affected by the scenarios considered. Only the long-term effects may be expected in the rural regions, especially for married and widowed females, and single and married males.

Projection results, discussed in terms of events, confirm also the importance of migration assumptions for population dynamics (see Tables 14-18).

Table 14. Projected number of births.*

Scenarios	1986-1990	2001-2005	2016-2020	2031-2035	2046-2050
Benchmark with migration					
Total	668.0	728.3	776.3	845.3	905.2
Urban	364.4	417.8	454.2	503.7	545.0
Rural	303.6	310.5	322.1	341.6	360.2
Migration 1					
Total	669.7	737.7	796.6	879.4	957.1
Urban	358.8	390.4	414.0	454.9	492.2
Rural	310.9	347.3	382.6	424.4	464.9
Migration 2					
Total	669.6	733.6	787.8	863.1	931.3
Urban	359.1	403.2	434.7	481.9	522.7
Rural	310.5	330.3	353.1	381.2	408.6

* Average number per year in thousands.

Table 15. Projected number of deaths.*

Scenarios	1986-1990	2001-2005	2016-2020	2031-2035	2046-2050
Benchmark with migration					
Total	378.2	452.8	531.3	614.5	630.8
Urban	215.2	279.8	354.7	427.1	446.7
Rural	163.0	173.0	176.6	187.4	184.1
Migration 1					
Total	378.2	453.1	531.7	614.9	632.8
Urban	215.0	278.3	350.5	416.5	426.2
Rural	163.2	174.8	181.3	198.4	206.6
Migration 2					
Total	378.2	453.0	531.5	614.7	632.1
Urban	215.0	278.9	352.2	421.2	436.4
Rural	163.2	174.1	179.3	193.5	195.7

* Average number per year in thousands.

Table 16. Projected number of marriages.*

Scenarios	1986-1990	2001-2005	2016-2020	2031-2035	2046-2050
Benchmark with migration					
Total	278.9	331.0	348.2	382.8	410.2
Urban	163.9	212.2	227.2	254.1	275.1
Rural	115.0	118.9	121.0	128.7	135.1
Migration 1					
Total	279.2	331.4	351.2	388.8	421.9
Urban	163.2	206.6	212.3	233.3	251.2
Rural	116.0	124.8	138.9	155.5	170.7
Migration 2					
Total	279.2	331.2	350.1	386.3	416.6
Urban	163.2	208.4	219.4	244.6	265.0
Rural	116.0	122.8	130.7	141.7	151.6

* Average number per year in thousands.

Table 17. Projected number of divorces.*

Scenarios	1986-1990	2001-2005	2016-2020	2031-2035	2046-2050
Benchmark with migration					
Total	49.0	51.6	56.5	61.0	66.2
Urban	41.3	44.3	49.0	53.2	57.9
Rural	7.7	7.2	7.5	7.9	8.3
Migration 1					
Total	48.9	50.4	54.4	58.4	63.6
Urban	41.1	42.4	45.5	48.5	52.7
Rural	7.8	8.0	8.9	9.9	10.9
Migration 2					
Total	48.9	50.9	55.5	59.9	65.2
Urban	41.1	43.2	47.2	51.1	55.7
Rural	7.8	7.7	8.2	8.8	9.5

* Average number per year in thousands.

Table 18. Projected number of migrants.*

Scenarios	1986-1990	2001-2005	2016-2020	2031-2035	2046-2050
Benchmark with migration					
Total	367.4	390.0	414.2	445.6	473.4
To urban	252.0	253.8	263.7	277.9	292.2
To rural	115.3	136.2	150.5	167.7	181.1
Migration 1					
Total	326.9	335.9	368.9	407.4	443.5
To urban	215.3	209.1	232.6	257.3	282.2
To rural	111.6	126.7	136.3	150.1	161.3
Migration 2					
Total	325.8	367.1	396.7	431.7	463.8
To urban	215.2	236.0	253.3	272.3	291.6
To rural	110.7	131.1	143.4	159.4	172.2

* Average number per year in thousands.

Conclusions regarding events can be briefly summarized as follows:

- The rise in the number of births expected for both populations under the BM scenario is much stronger under the migration scenarios, in particular in rural areas.
- In all applied scenarios the death intensity was at the level observed in the years 1981-1985. For the rural population only the long-time impact of different migration patterns is visible. For the urban population a marked increase may be noted under all scenarios. The three scenarios result in similar trends in the number of deaths.

- Also marriages are little affected by the migration scenarios chosen here. In all three scenarios is the rise in urban marriages somewhat stronger than in rural ones.
- When mobility is relatively low (Migration 1 scenario) divorces in rural areas grow continuously. However, for higher migration levels (Benchmark scenario), a marked decrease in the number of divorces until 2001 is predicted. The reason is that migration tends to pull young married couples away from the rural areas.
- Projections of the number of migrants between the urban and rural regions are obviously influenced by migration assumptions, but not very strongly.

4. FINAL REMARKS

Projections prepared for urban and rural regions under different assumptions on migration patterns confirm that spatial differentials and internal migration affect considerably the future demographic changes in Poland. Some of these developments have to be pointed out, summing up our discussion.

The growing number of old women, mainly widows and divorcees, and the increase in the number and share of single and divorced men are the most distinctive features of changes in living arrangements of the elderly. The remarkably high proportion of unmarried women in urban regions requires adjustments of the social care system because changes in household composition and kinship relations in that region, together with housing conditions, may be considered as factors diminishing the supply of family care for the elderly.

In this paper only scenarios including assumptions on spatial mobility have been discussed. Other scenarios have also been applied with different assumptions for reproduction and nuptiality in urban and rural regions, i.e. a marital fertility decline, an increase in divorce, and a drop in marriage, according to trends observed recently and the expected changes in the future (Kotowska, 1993). They were assumed to take place gradually over the period 1986-2005, similar to the IIASA scenarios (Gonnot, 1990), which have been used to prepare marital status projections for Poland without regional cross-section. The latter projections are discussed by Fratczak and Jozwiak (1992).

Projection results for the regionally specified scenarios and also recently observed trends in fertility, nuptiality and divorce show that reproduction below replacement level is one of the crucial elements of demographic developments in Poland. Existing irregularities in the age composition and expected rapid aging after 2005 are arguments for maintaining fertility at replacement level in order to improve relations between broad age groups. It is one of the population policy goals formulated by demographers. Keeping in mind the spatial differentials in reproduction, one can conclude that such a policy should be aimed at a fertility increase in urban areas and at stopping the decline in the rural ones. It would imply a nuptiality-oriented policy in Polish conditions. The situation in urban areas seems to be relatively difficult from this point of view because of the expected changes in marital pattern (an increase in the share of unmarried persons). They could be intensified by recent developments in Poland. For instance, the growing economic dependence of young people on their parents (unemployment, housing difficulties), and female discrimination in the labor market may postpone marriage and fertility decisions.

The internal migration pattern is an important factor for demographic changes in rural regions. Projection results for that population are much more sensitive to different migration assumptions than results for the urban population. This can be explained not only by the size of

the rural population, but mainly by the importance of migrants for the reproduction process in that region. Their "contribution" to that process depends on fertility, nuptiality and divorce characteristics, which are remarkably different from those of the urban population. A decline in streams to towns could stop the unfavorable changes in the age-sex composition of the rural population. Improvement of living conditions in the rural areas would influence, via migration patterns, the aging process, the marital composition and fertility in these areas.

Our results showed clearly the influence of spatial differences in population dynamics components on demographic development. Population projections by marital status and place of residence are of great importance for studies in living arrangements, especially of the elderly, their spatial differences and for discussions on proper social security system solutions. That information brings new insights into the future aging process and should be considered basic in order to assess needs for social care and their spatial differentiation, as well as to evaluate its costs. Population projections, prepared by the CSO, do not include marital status. Thus, it was the first attempt to study future demographic changes taking into account region and marital status disaggregation simultaneously.

The population projections discussed here have been prepared without taking international migration into account. There has been a tendency to go abroad temporarily for economic reasons. Some of these temporary migrants decide to stay abroad permanently. They are mostly people in mobile working-age groups, i.e. aged 20-44. Recent labor market developments in Poland (large-scale and long-term unemployment) could intensify that tendency. This component may intervene in the predicted course of demographic processes. Unfortunately, exact figures of international migrants are not known. For future research it would be useful to investigate not only internal migration, but also the influence of external migration on the age-sex-marital status composition of the population in Poland.

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APPENDIX

The benchmark scenarios include the assumption that the reproductive pattern as observed in the years 1981-1985 applies to the future, too. The B0 scenario (zero-migration scenario) does not include internal migration; the BM scenario keeps migration at the level as observed in 1981-1985.

The migration scenarios adopt the same reproductive pattern as the BM scenario but supplemented by assumptions on internal migration.

In the migration scenario 1, migration (M1) assumptions are based on changes observed during the years 1980-1985. They are formulated as follows:

* Streams to urban areas:

-   a decline by 30 per cent of migration rates for children aged 0-9, single females aged 30-39, and married persons aged 20-39;
-   a drop by 40 per cent of migration rates for single males aged 20-39 and by 50 per cent for single females aged 20-29.

These changes are assumed to take place gradually over the period 1986-2000. The rates which apply to the years 1996-2000 are assumed to be constant until 2050.

* Streams to rural areas:

-   a decline by 40 per cent of migration rates for single males aged 20-39 and by 35 per cent of single females aged 20-29;
-   a rise by 10 per cent of migration rates for married males aged 25-34 and by 15 per cent for married females aged 20-34 and children aged 0-9.

These changes are assumed to take place gradually over the period 1986-1995. The rates which apply to the years 1991-1995 are assumed to be constant until 2050.

The migration scenario 2 (M2) assumes that the decrease in spatial mobility stops in the years 1991-1995 and that a slight improvement may occur in the next five-year period. It is expressed by the following changes in the proper rates:

* Streams to urban areas:

-   a decline by 20 per cent of migration rates for children aged 0-9, single females aged 30-39, and married persons aged 20-39 till 1995, and an increase by 10 per cent in the period 1996-2000;
-   a drop by 30 per cent of migration rates for single males aged 20-39 till 1995, and an increase by 15 per cent in the years 1996-2000;
-   a drop by 40 per cent for single females aged 20-29 till 1995, and an increase by 15 per cent in the years 1996-2000.

The rates for the years 1996-2000 are assumed to be constant until 2050.

* Streams to rural areas:

- a decline by 30 per cent of migration rates for single males aged 20-39 and single females aged 20-29 till 1990, then in the period 1991-1995 an increase by 15 per cent for males and 10 per cent for females;
- a rise by 5 per cent of migration rates for married males aged 25-34, and by 10 per cent for married females aged 20-34 and children aged 0-9 till 1995.

Over the period 1996-2050 the rates are at the 1991-1995 level.

All assumed changes are formulated with respect to the initial values of appropriate rates, i.e. to the values obtained for the period 1981-1985.