WPS-2457

POLICY RESEARCH WORKING PAPER   2457

Urban and Regional Dynamics in Poland

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Poland's continuing housing shortage reduces labor mobility, which reduces potential growth. Improving housing is essential to improving economic growth in Poland.

Summary findings

In this exploration of urban and regional dynamics in Poland after the transition, Deichmann and Henderson find that the degree of urbanization and primacy remains low in Poland. The largest cities are not growing at the rate that would be expected if post-transition adjustments were operating freely. As a result, Poland is not fully realizing external economies from urban agglomeration.

Internal migration decreased significantly in the 1990s, with rural-to-urban migration declining dramatically. Current population levels everywhere seem frozen at a degree of urbanization that is low by international standards. Migration levels do not respond to unemployment differentials, perhaps because Poland's continuing housing shortage deters migration. Housing construction, which was already low, fell by half in the 1990s and has only recently begun a slight recovery.

A significant number of mostly young and educated temporary migrants leave Poland annually, many to find employment abroad. This may reduce pressure on the Polish labor market but also keeps dynamic actors out of the domestic labor force, reducing growth in urban businesses and industry.

Employment in manufacturing and agriculture is relatively concentrated, but specialization seems to have declined in recent years, perhaps reflecting barriers to labor mobility—which could limit growth.

That employment in the manufacturing sector is quite concentrated is to be expected in a formerly planned economy. But employment in the service sector is also quite concentrated. A geographic divergence of service activities is not explained by dominant growth in specialized financial and business services in the capital alone.

Poland's policymakers should find a way to provide housing, thereby reducing barriers to labor mobility and growth.

Urban and Regional Dynamics in Poland[1]

Uwe Deichmann[2] and Vernon Henderson[3]

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Executive summary

This paper consists of three short, self-contained research notes on various aspects of urban and regional economic development in Poland. This material was compiled at the request of the Europe and Central Asia Department of the World Bank. The three topics we discuss are urban population agglomeration and population mobility, economic sector transformation and growth, and demographic patterns.

Although changes in statistical data collection after the transition from socialism make the analysis of post-transition economic trends difficult, our analysis has identified a number of interesting developments. The degree of urbanization and primacy in Poland remains low. The largest cities are not growing at a rate that would be expected if post-transition adjustment processes were operating freely. A consequence may be that external economies due to urban agglomeration are not fully realized in the Polish economy.

Trends in migration confirm this finding. Internal migration has decreased significantly in the 1990s with rural-to-urban migration showing the most dramatic decline. Overall population trends indicate that current population levels in urban and rural areas seem almost frozen at a degree of urbanization that is low by international comparison. Migration levels also do not appear to respond to large unemployment differentials across small geographic areas. One explanation for these trends may be the continuing housing shortage in Poland, which may deter potential migrants. From already low levels, housing construction had fallen by more than fifty percent during the 1990s and has only recently begun a slight recovery.

While internal migration as well as permanent international migration are quite low, a significant number of mostly young and educated temporary migrants leave Poland annually—many to find employment abroad. This may reduce pressure on the Polish labor market, but it may also keep some of the more dynamic actors out of the domestic labor force, thus reducing growth in urban based businesses and industry.

Employment in manufacturing and agricultural activities is relatively concentrated in Poland. There is some indication of regional convergence in the manufacturing sector. However, this trend does not appear to be leading to voivod specialization. In fact specialization appears to have declined in recent years. This may be a further reflection of barriers to labor mobility. Significant growth potential may be unrealized, if specialized workers do not relocate to areas where their skills are in demand by a concentrated cluster of similar industries.

While geographic concentration of the manufacturing sector is to be expected—especially in a formerly planned economy—service sector employment is also quite concentrated. Furthermore, there appears to be further geographic divergence of service activities. This trend seems to be general across services and is thus not explained by dominant growth in specialized financial and business services in the capital alone. Divergence in growth of any activity across regions, especially for services which are most non-traded across regions, is very unusual and is unlikely to persist far into the future.

This study provides a reconnaissance view of urban and regional dynamics in post-transition Poland. Although it is not possible to provide conclusive answers to many of the policy questions, we have identified a number of issues that would deserve closer investigation. The most important issue is probably to identify the major barriers to labor mobility, in particular the role of the housing market. Given that a decreasing average household size will increase demand for new dwelling units further, even with stable population trends, housing provision may be one of the primary policy questions facing Poland in the near future.

Data sources

Unless otherwise indicated, all data sets used in this study came from the Polish Central Statistical Office (Glowny Urzad Statystyczny, GUS, www.stat.gov.pl) in Warsaw either as hardcopy publications or in digital format. A list of the statistical publications used for this study is included in the bibliography.

Maps

Although Poland has recently changed its administrative structure and has reduced the number of voivods from 49 to 16, statistical information over time is available only for the old set of regions. These have been used throughout in our statistical analysis and to display economic and social variables. To keep the maps simple, we have added only limited annotation. The appendix contains a reference map that indicates the voivod names.

I.   Urban population agglomeration and population mobility

Introduction and summary

This note examines aspects of urban agglomeration and population mobility in Poland. Like other ECA countries, Poland started the transition with unusual features compared to many countries. The effect of the transition on these features and some disturbing developments since transition are discussed. Key findings are:

1) Poland has a low degree of urban concentration. The primate urban area size is small and there is a quick drop-off in city sizes moving down the urban hierarchy. This suggests that urban agglomeration economies are not fully exploited, with attendant growth losses. In the case of Poland the growth losses are estimated to be 3/4 of a growth point a year.

2) As is common, the ranking by size of cities in the top echelon has not changed since 1950, but there has been lots of upward and downward mobility in city size rankings below the top echelon. In the 1970's and 1980's there was some catch-up where smaller cities as a group grew more quickly than bigger cities, but that trend stopped in the 1990's.

3) Migration in Poland, whether urban-urban, rural-rural, or rural-urban, has dropped dramatically since transition. This drop appears to be tied to tightness in the housing supply, induced by poorly functioning housing markets. Poland's already low rates of housing completions and residential housing investment have dropped to very low levels since transition.

4) While permanent international migration, which has been very significant in Poland's history, has declined considerably, temporary labor migration mostly to Western Europe is quite considerable. This temporary labor migration may act as a "safety valve", reducing pressure on the local labor markets and it may also lessen the need for rural workers to move to urban jobs. However, the large number of temporary workers also means that a large pool of skilled workers is potentially unavailable in dynamically growing domestic sectors.

Agglomeration and mobility

In this section, we look at the extent of urban agglomeration in Poland and how the extent of agglomeration has changed over time. The concern is whether Poland is under-agglomerated and whether transition is helping that process.

The Extent of Agglomeration.

The extent of urban concentration in ECA countries is modest compared to other countries in the world. The simplest measure of urban concentration is primacy – the fraction of the national urban population living in the largest metro/urban area. Based on the urban agglomeration of Katowice (3.4m people), Poland's primacy is 0.14, compared to an international average of 0.31. Primacy does vary in a consistent fashion with country size, income and openness to trade. Controlling for these features, Box 1 indicates that ECA countries overall have a primacy value that is less than expected by 0.13. Poland's primacy in 1995 is 0.066 less than expected, a deficit that has increased in recent years with the stagnation of the population size of Poland's larger metro areas. Moreover Katowice is an unusual metro area with a small central municipality ($1/10^{th}$ of the urban area population). If Warsaw at a population of 2.2 million were used for the primacy measure, Poland's under-concentration would look even greater.

Box 1: Amount Primacy Differs From its Expected Magnitude by Region
(Mean primacy = 0.31)

	(1)			(2)
Asia	-.039*	Poland	1975	-.021
Sub-Saharan Africa	-.016		1980	-.036*
Eastern Europe-Central Asia	-.133*		1985	-.043*
North Africa Middle East	-.053*		1990	-.045*
Latin American	.042*		1995	-.066*

The coefficients are from an analysis of residuals from GMM panel data estimation. Controlling for annual income per capita, national urban population, openness to trade, national land area, kilometers of inland waterways, and whether the city is a port or a national capital, the coefficients are the magnitude by which primacy is less or greater compared to European and North American countries. Column 1 gives numbers which average over 1975-1995 (with five-year time intervals) for regions of the world. Column 2 is for Poland, where effects are allowed to vary over time. An asterisk indicates a coefficient significant at the 5% level.

Urban concentration describes the magnitude of agglomeration of urban activity in a country compared to other countries. A typical measure of urban concentration is primacy – the share of the largest city in national urban population.** The numbers in the table tell us the extent to which primacy in a region or country differs from what is expected, given a country's size and economic circumstances. Mean primacy worldwide is .31, so a coefficient of -.13 means primacy is 43% less than expected. The table indicates that in ECA countries, primacy is much lower than in other countries. The ECA region is an outlier. Poland also has lower primacy than expected, with the extent of under-concentration rising over time.

**Given the strong fit of the rank-size relationship in most countries (see next box), primacy and other measures of urban concentration are highly correlated.

The concern with low primacy is that scale economies inherent in the urbanization process are not being sufficiently exploited, resulting in productivity and growth losses. Econometric work in Henderson (1999) suggests that conditional on country characteristics there is an optimal degree of urban primacy/concentration and too little or too much results in really significant growth losses. For Poland at more than .05 below best primacy, this translates into 3/4 of a percentage point reduction in annual growth rate of GDP per capita. This problem may grow as the economy shifts increasingly into production of modern business, financial and professional services. Such activities as they complement R&D and headquarters activities seem to best thrive in large urban environments. This concern with lack of urban agglomeration is further heightened when one looks internally in Poland at the size distribution of cities.

Box 2 reveals that, within Poland as we move down the urban hierarchy, city sizes decline more rapidly than expected compared to other countries. That is, cities in Poland are farther apart in size than usual, so that most cities are relatively small compared to Katowice. Put together, we have a relatively small largest urban area in Poland, with sizes of other cities dropping off quickly. This suggests an economy-wide lack of exploitation of the local scale externalities inherent in market economies. These external economies—

efficient local supplier networks, a large shared pool of specialized workers and knowledge spillovers due to the ease of information exchange—were well described by Alfred Marshall in 1890 and have been part of the economics research agenda since then.

Box 2: Urban Hierarchies: Zipf's Law

Poland: Rank Size Coefficient
(The elasticity of rank with respect to size)

1950	1960	1970	1980	1990	1995
.74	.79	.82	.86	.90	.90

The rank size coefficient is from a regression of ln (rank) = α - β ln (urban area population). Standard errors range from .017 to .019 with R^2s of .98 - .99. The sample in each year consists of the five UN urban agglomerations for Poland plus 26 municipalities, where each municipality pretty well defines the relevant urban area. See Gabaix (1999) and Black and Henderson (1999).

Geographers and economists have noted an empirical regularity for most countries around the world. In any country, if urban areas are ranked from largest (1) to smallest, then rank multiplied by population size is approximately the same for all cities in the economy. That is, the elasticity (defined to be positive) of rank with respect to population size is one, so a 1% decline in urban area rank is associated with a 1% decline in size as we move down the hierarchy of cities in a country. Indeed, a recent UN evaluation found the mean and median of the elasticities in a sample of 22 countries worldwide to be close to one. Poland's elasticities are significantly less than one, as the table indicates, although the elasticity has risen in recent years. Elasticities less than one mean as city sizes decline down the hierarchy, there is a smaller associated change in rank. Fewer cities lie in any city size interval and city sizes are spaced further apart than in a typical country.

Changes in Agglomeration.

In the period 1950-1990, there was some significant increase in the degree of urban concentration in Poland. Box 2 notes some possible reduction in city size inequality up to 1990. In Box 3, we explore this possibility in more detail. As is the case internationally, cities in the top echelon don't change rank over time—the big stay big in the order they started off, given their large infrastructure stocks, human resources, and political power (see Eaton and Eckstein, 1997). In Poland the five dominant urban agglomerations as defined by the United Nations, including Katowice, continue to grow in the 1990's. These agglomerations are all growing but the populations of their central cities (i.e., the municipalities) are shrinking. This suggests that there may be some degree of internal metro area deconcentration, "suburbanization", or peri-urban development occurring. Table 1 below gives the numbers on suburban gain for the main metro areas with a single core city.

Table 1: Population of major cities and urban agglomerations

	city		urban agglomeration		suburban gain
	1990	**90-95 change**	**1990**	**90-95 change**	**90-95**
Warsaw	1656	-21	2165	54	75
Katowice	360	-8	3357	68	76
Krakow	744	1	806	26	25
Lodz	838	-15	1030	11	26

Figure 1: Population growth in urban agglomerations 1950-1995
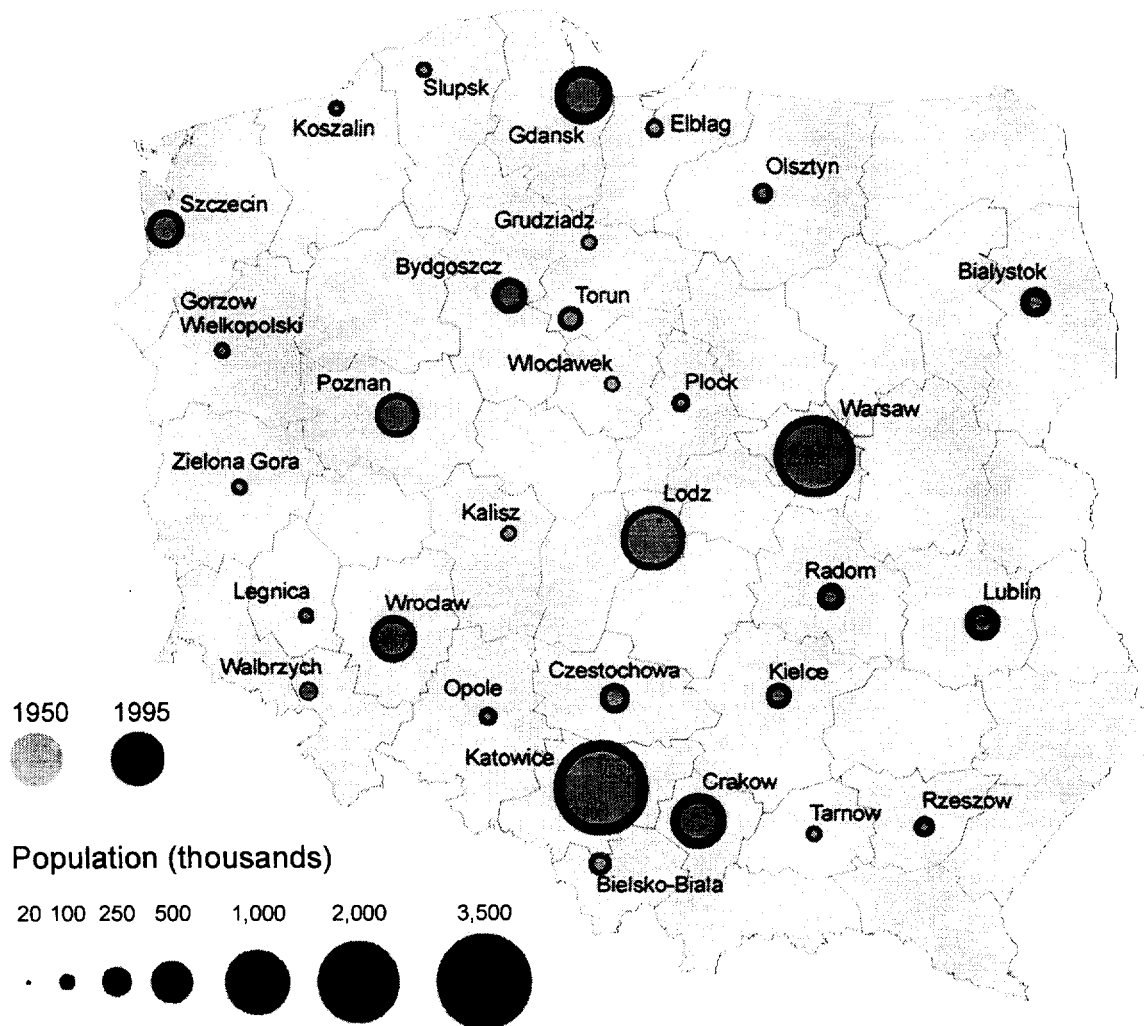
Below the top echelon, there is lots of upward and downward mobility in rankings of cities, with cities moving up and down the hierarchy as circumstances and production patterns change in cities and in their

surrounding regions. Figure 1 demonstrates this visually, comparing 1950 with 1995. The map shows some remarkable growth of what were small cities in 1950. Box 3 also shows that, not only have cities moved up and down the hierarchy, but the variance of the relative size distribution of cities has shrunk considerably. This potentially desirable trend of smaller size cities slowly starting to catch up to the biggest cities seems to have slowed in the late 1980's and ground to a halt in the first half of the 1990's.

Box 3: Are Small Cities Catching Up to Big Cities?

(a) Change in Rank in the Size Distribution

		top 5	top 10	bottom 21
no. of cities changing rank	since 1950	0	2	20
	since 1960	0	0	20

(b) Annual Speed of "Convergence"

1950 - 1995	.0058*
1980 - 1985	.0051*
1985 - 1990	.0026*
1990 - 1995	0

(c) Variance of Relative City Sizes

1950	1960	1970	1980	1990	1995
88.3	87.2	80.8	75.9	70.8	71.5

In part (b), the annual speed of convergence is λ where $\beta = (1- \exp(-\lambda\tau))$ for τ the length of the time interval and β the coefficient from a regression ln (city pop(t)) − ln (city pop(t-1)) = α - β ln (city pop(t-1)). An asterisk indicates a coefficient significant at the 5% level. In part (c), since size populations are increasing over time with technological change, we focus on the relative size distribution − sizes of cities divided by average city size at that time. The variance is for that variable. For the USA it is essentially constant over time.

There are three aspects to catching up in most analyses of city size distributions. The first concerns stability of rankings by size. In general in countries there is great stability in rankings at the top of the size distribution and this is the case in Poland. From 1960 − 1995, no cities in the largest 10 changed rank, while 20 out of 21 of the rest moved up or down in the urban hierarchy. The big stay relatively big, with little significant switching in relative size. Mobility and change in rank is at the lower end of the distribution.

Mobility is also measured by the speed of convergence − the annual rate at which small cities are catching up to big ones. But in the case of city size distributions, there is no convergence to a common city size, and, in many countries, there is little change in the relative size distribution over time. "Convergence" is usually just regression to the mean, generated by upward and downward mobility among cities below the top echelon. In Poland, what part (b) of the table reveals is the slowdown in mobility (or mean reversion) since 1985, and especially for 1990-1995.

What is interesting in Poland, compared to Japan, France and the USA is that there has been some real catching up. The variance of relative city sizes declined steadily from 1950-1990. After 1990, consistent with other analyses, the system has frozen to some extent. Part (c) of the table shows the variance of relative city sizes across the 31 cities declining from 88 to 71 from 1950 to 1990. This suggests, consistent with the increase in the rank size elasticity, that overall smaller cities have been catching up to bigger ones.

At the provincial, rather than city level, patterns are similar. There is little mobility of provinces in the top echelon, but lots of switches in ranks among the smaller urban centers. While the variance of relative total populations is not shrinking, the variance of relative urban populations has decreased. And as with cities, mobility, or "convergence" of provincial urban populations has declined in recent years. This change in mobility of cities and provinces is of some interest and is explored next in the context of the general urbanization and migration process in Poland.

The decline in mobility with transition

A map of baseline urbanization in 1985 is given in Figure 2, and Figure 3 shows that in the periods 1980-1985 and 1985-1990 there was strong growth in many of the less urbanized regions in the eastern voivods, but after 1990, mobility all round dampens. This is surprising.

Figure 2: Urbanization by voivod, 1985

Percent urban
population, 1985

2 5   3 5   4 5   5 5   6 5   7 5   9 5
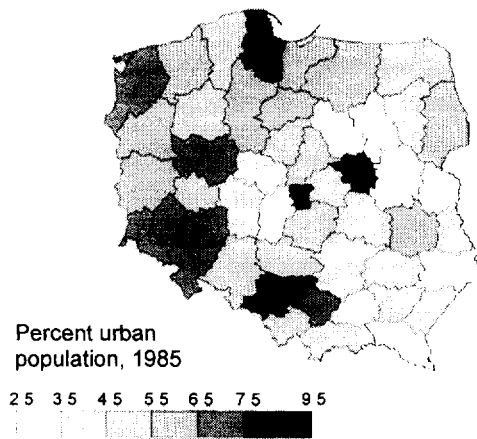
Figure 3: Population growth by voivod 1980-1995

Total   Urban

1980
to
1985

1985
to
1990

1990
to
1995

Average annual population
growth rate (percent)

0   0.5   1   1.5   2
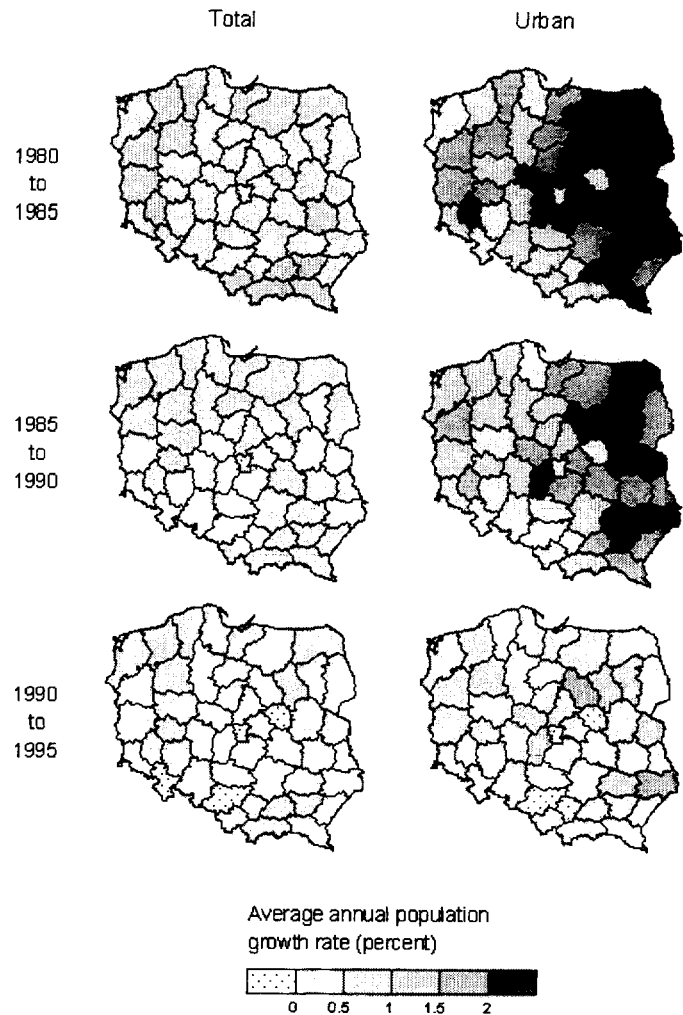
The move to a market economy transformed the economic geography of Poland as we will see below, with rapid expansion and declines of different industries in different voivods. That transformation led to

high unemployment and strong differentials in unemployment rates across voivods that were affected differentially by transition. Figure 4 illustrates the dynamics of unemployment rates by voivod in the 1990's, where unemployment increased drastically in the early 1990's, peaking around 1993/4. Since then unemployment has decreased considerably, although less so recently in the East and West. What is striking in Figure 5, which shows unemployment rates for 1998, is the enormous differential in unemployment rates across voivods that are side-by-side. They remain very high in the Northern voivods, some of which had fairly high initial concentrations of manufacturing, and high in the South-West corner of the country, again a major heavy industry region.

Figure 4: Trends in unemployment rates in voivods, 1990-1998
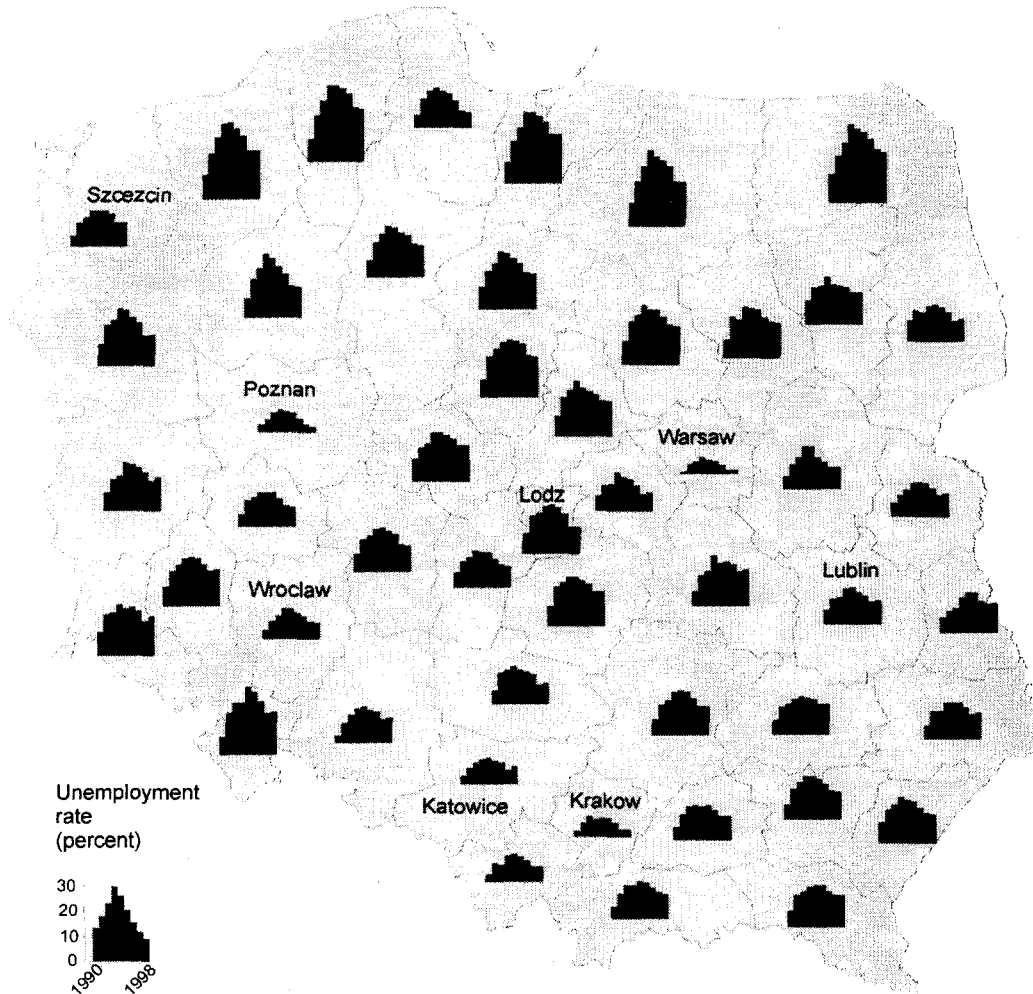
As we will discuss below, some of these differentials may be misleading, given that some of the unemployed may regularly do seasonal work in Western Europe. However these big differentials in voivod unemployment rates are also accompanied by increasing wage differentials.

Table 2 below notes the increasing variance in relative wages, to be expected in a situation where wages are increasingly determined by market forces. Given increasing wage differentials and persistent differentials in unemployment rates across even neighboring voivods, one would have expected migration flows to increase. But, as we will discuss next, the opposite happened.

Figure 5: Unemployment by voivod, 1998

Unemployment rate, 1998 (percent)

- 2.6 - 4.1
- 4.1 - 9.4
- 9.4 - 12
- 12 - 14.2
- 14.2 - 16.4
- 16.4 - 20.5
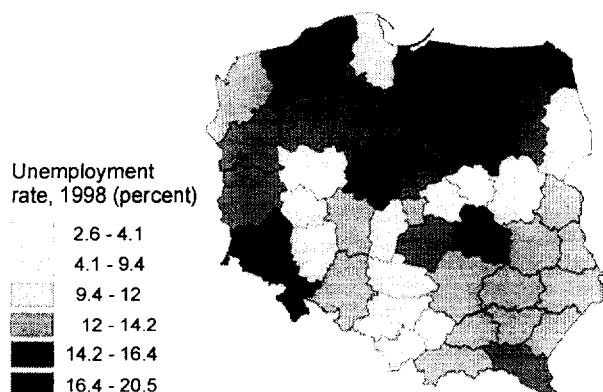
Table 2: Relative wage variance across voivods

Manufacturing		Services	
1994	1998	1994	1998
0.62	0.76	0.54	0.75

Note: Relative wages are voivod wages divided by the national average wage.

Internal migration

The decline in mobility is reflected directly in migration figures. Box 4 and Figure 6 show the decline in inter and intra provincial population flows. Of special interest is the decline in rural-urban migration and the slight increase in urban-rural migration since transition. Something is inhibiting net migration within Poland—from the countryside into cites, as well as migration across cities. Significant factors could be international migration and the operation of housing markets, which we will discuss in the next sections.

Box 4: The Slow-Down of Migration

Gross Migration Flows ('000)

Across Voivods

	Total	Urban-Urban	Urban-Rural	Rural-Rural	Rural-Urban
Avg. 1986-89	630	168	91	144	227
1994	438	130	90	90	129
Avg. 1997-98	422	123	100	86	113

Within Voivods

	Total	Urban-Urban	Urban-Rural	Rural-Rural	Rural-Urban
1989	369	81	53	85	150
1994	277	64	63	61	87

Post-transition migration flows are lower than in the past. Not only have total flows across and within provinces decreased, but rural to urban flows have dropped enormously and urban to rural migration has increased modestly. While in net, people are moving from rural to urban areas, the pace since transition has slowed.

Figure 6: Inter-voivod migration trends
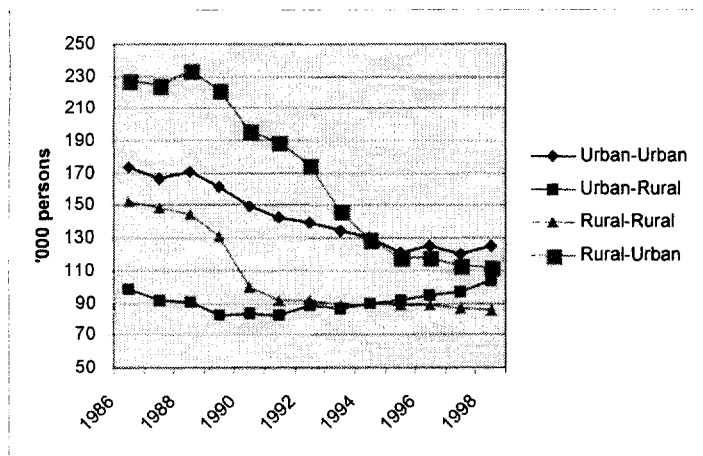
International migration

International migration is a complex issue in Poland since the potentially most significant migration dynamics are not captured in official statistics. Official permanent migration has often been significant in Poland's history with large emigration to the United States, Canada and Western Europe. Net migration has been negative during the last four decades in all but three years (Figure 7). During the 1990s, net out-migration has been relatively low at between 11,000 and 20,000 following a large spike in out-migration of 97,000 in 1988. The large outmigration in the late 1980s can be largely attributed to the movement of ethnic Germans from Poland to West Germany. The magnitude of this migration has been much larger from Poland than from other countries in East-Central Europe (Table 3). By 1994 this component of international migration had become insignificant.

Figure 7: Net migration, 1960-1998
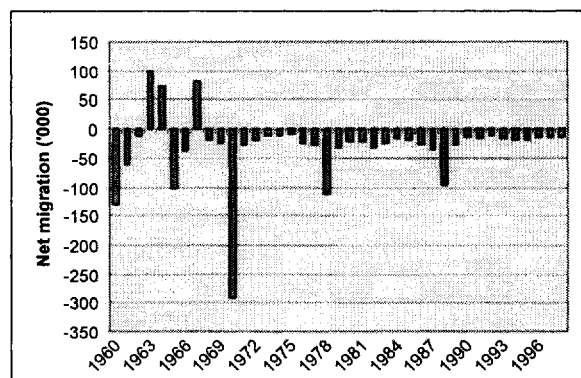
Table 3: Migration to (West) Germany from the territories of the former CSFR and from Poland and Hungary ('000)

| | Ethnic German immigrants from: | | |
	Poland	CSFR	Hungary
1987	48.4	0.8	0.6
1988	140.2	0.9	0.8
1989	250.3	2.0	1.6
1990	113.3	1.3	1.0
1991	40.1	0.9	1.0
1992	17.7	0.5	0.4
1993	5.4	0.1	0.0
1994	2.4	0.0	0.0

Source: Federal Statistial Office, Germany

In contrast to permanent migration, temporary migration continues to be very significant. Unfortunately, there is very little statistical information available about this type of migration. A microcensus in 1995 showed that about 900,000 Polish citizens spent more than 2 months abroad. This figure may well include persons who may not actually return to Poland. While there is no information available from Polish statistics, we can assume that a large proportion of these temporary migrants travels to Western Europe on official work visas. Information available from German statistics shows that in the mid-1990s approximately 150,000 persons from Poland entered Germany as seasonal laborers to work mostly in agriculture, hotels and restaurants (Table 4; see Engfer and Seng, 1997). A smaller number entered as contract workers employed mostly in the construction sector. It is likely that an additional number of temporary migrants worked abroad without a working visa.

Table 4: Temporary labor migration to Germany

Seasonal labor

	Poland	Hungary	Czech Republic	Slovakia
1993	**143,861**	5,346	12,027	7,781
1994	**136,659**	2,458	3,465	3,939
1995	**170,576**	2,841	3,72	5,442

Contract workers

	Poland	Hungary	Czech Republic	Slovakia
1993	**20,424**	13,563	-	-
1994	**13,496**	9,055	1,656	1,405
1995	**24,187**	9,116	2,151	2,048

Source: Federal Labor Office, Germany

The 1995 microcensus carried out by the Polish Statistical Office shows that females tend to make up a larger proportion of the younger temporary migrants while the number of males is larger in older age groups (Figure 8). Overall, the largest number of temporary migrants tend to be in the 25-39 age brackets. Most of these migrants have at least secondary education which includes vocational training. Unfortunately, we do not have information on the origin of temporary migrants within Poland by urban/rural residence and voivod.

Figure 8: Characteristics of temporary migrants
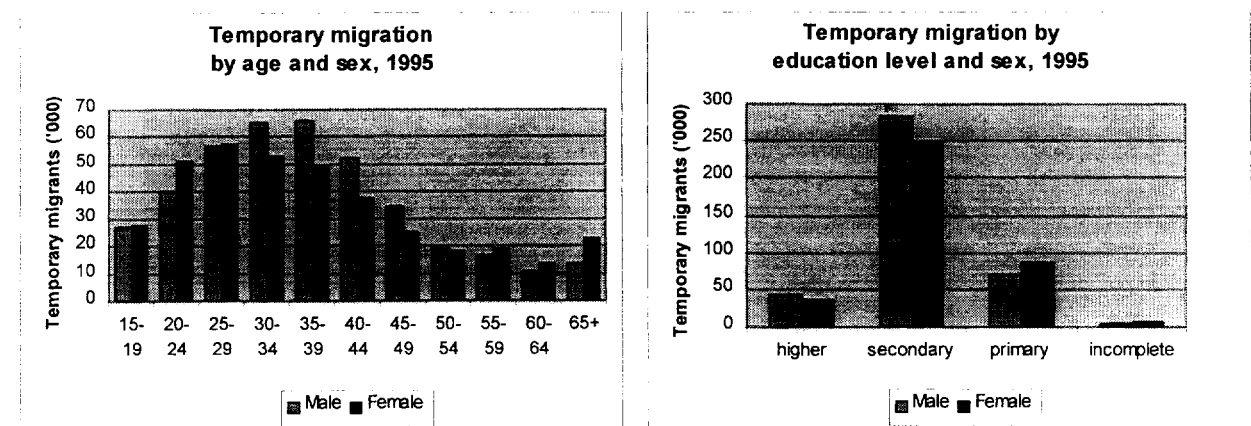
The implications of this large movement of people seeking temporary employment abroad are not well studied. Typically migration should have significant benefits for a country. If unemployment in the country of origin is high, pressure on local labor markets will be reduced. Returning migrants may bring newly acquired skills back to their country which will benefit the local economy. Most importantly, temporary migrants tend to transfer savings back to their home country which will increase local demand as well as investment and capital formation.

Whether these benefits are realized in the Polish case is unclear. Although unemployment is still quite high in many parts of the country, as shown elsewhere, it is fairly low in the economically most dynamic parts of the country—most notably in Warsaw. Labor migration abroad of young and relatively well educated persons may in fact reduce the pool of skilled labor in dynamically growing industries and service sectors. It is also unlikely that a significant transfer of skills will occur. While some temporary migrants go abroad to acquire additional training, a considerable number of quite highly educated people work in jobs requiring little or no education in the agricultural sector, hotels, restaurants or construction.

Remittances and repatriation of earned income, in contrast, are very likely to have a large impact on the local economy. While there are no official statistics available, some estimates suggest that the amount of money transferred is very significant. A study quoted by Engfer and Seng (1997) estimates that in the 1991-96 period about DM 6 billion (3 billion US$ at current exchange rate) were transferred by contract workers in Germany alone. By comparison, total FDI to Poland was about 1 billion DM in 1994. At the micro-level, an Austrian study carried out in 1994/5 showed that households which had sent at least one household member abroad in the previous five years tended to be better off than households without migration; although the difference among Polish households was not statistically significant (Table 5). This study found that in Poland, members of approximately 6.8% of all households surveyed had worked abroad in the previous five years suggesting a total temporary migration of about 850,000. This is consistent with the microcensus and also supports evidence that a large proportion of temporary migrants work abroad year after year, often for the same employer.

Table 5: Relative income position of households with labor migration within the last five years

	Poland	Hungary	Czech Republic	Slovakia
without migration	96	101	105	100
with migration	114	176	141	113
Significance of differences	0.333	0.029	0.016	0.079

Source: Institut fuer die Wissenschaften vom Menschen, Vienna

Temporary labor migration may also provide a partial explanation for the low internal migration rates that we have discussed elsewhere. Migrating to dynamically growing regions of the country may be hindered by housing shortages (see next section) and other reasons. Working abroad for part of the year may be a viable alternative, since the large wage differentials between Poland and Western Europe allow migrants to earn as much or more income abroad as they would in the local economy. The high number of temporary migrants also shows that the low rates of internal migration cannot be due to a lack of mobility of the workforce in the sense of "willingness to move", since a large number of workers readily travels abroad to seek employment opportunities.

Housing markets

A key issue in population mobility may be continuing and even worsening housing shortages. People can't move to desirable locations if there are no dwellings to move into. In 1988 the World Bank analyzed how housing shortages were inhibiting efficiency in migration patterns and slowing agglomerative tendencies, as well as representing a missed investment opportunity (Mayo and Stein, 1988; see also Pogodzinski, 1995). More recent statistics show that the situation has not improved significantly. Interestingly, Polish official statistics contain only limited information on the number of households. Instead, numbers are reported as the number of dwelling units per 1000 population. This figure was 302.3 in 1998 after a steady increase from 288.7 in 1990. However, this number is still significantly lower than the Western European average of about 400 (Blunt and Muziol-Weclawowicz, 1998).


Box 5: Housing Tightness

(a) Ratio: households to dwelling units

	1980	1988	1995
Poland	**1.18**	**1.12**	**1.13**
ECA	1.07	--	--
Rest of Europe	.95	--	--

(b) Dwellings completed per thousand population

	1980-1985	1991-1995	1995-1998
Poland	5.3	2.6	1.9

(c) Ratio: investment in residential construction to GDP

	1980	1995	1998
Poland	5.5	1.5	1.7

Poland has long been known for its extreme housing shortages (see S-K. Mayo and J.I. Stein, 1988, for a review and the source of 1980's numbers in the table). In the 1980's there was improvement in the ratio of households to dwelling units, although the Polish number remained 18% above a European norm. Since the later 1980's the situation has deteriorated. Completed dwellings and the ratio of housing investment to GDP today are a fraction of Poland's 1980's number, which in themselves were low by international standards.

The increase in the total housing stock through the 1990s also hides a significant slump in new housing construction. As Box 5 shows, although the number of dwellings per 1000 population has improved, Poland's high ratio of households to dwelling units has actually started to increase again, reflecting declining household sizes. At the same time dwelling completion rates and investment rates have plummeted with signs of recovery only in the most recent years. Housing completion dropped drastically from a high of almost 140,000 or more than 4.5 per thousand population in 1992 to a low of just over 60,000 or less than 2 per thousand population in 1996 (Figure 9). The situation is improving somewhat

faster in urban than in rural areas, although at current levels of housing construction the large pent-up demand is unlikely to be satisfied in the foreseeable future.

Figure 9: Housing construction

Dwellings completed per 1000 population
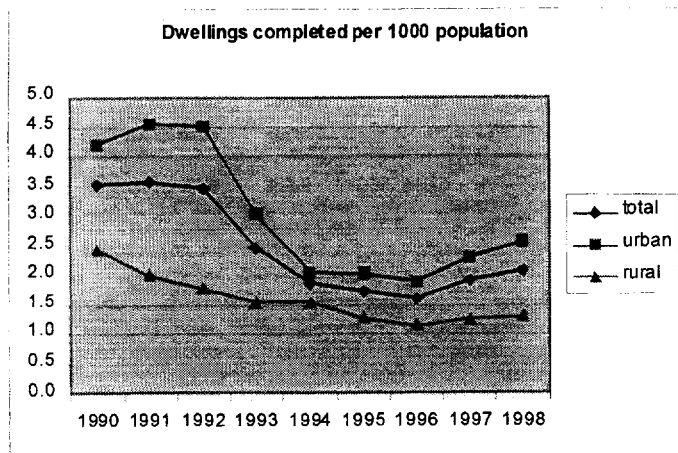
Regionally, the number of dwelling units per one thousand population is lower in the rural areas of the southeast than in the more urbanized areas. This is in large part a reflection of the larger household sizes in more traditional regions of the country (Figure 10).

Figure 10: Dwelling units per 1000 population by voivod

1990   1998

Dwelling units
per 1000 population

237 - 270
271 - 300
301 - 330
331 - 360
361 - 390
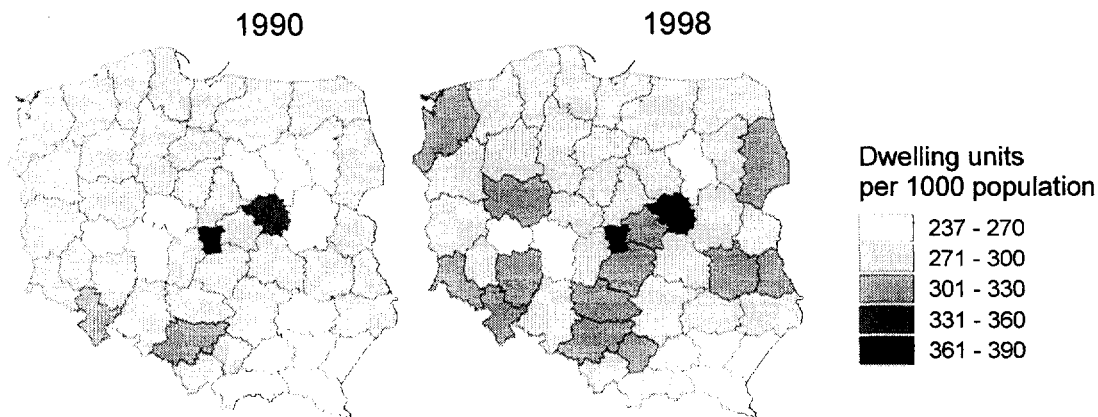
Figure 11 provides additional detail showing trends in dwelling unit completion between 1990 and 1998. While some of the more urbanized voivods, including Warsaw and Gdansk, do not show a significant drop-off in dwelling unit construction, they may still be foci of supply shortages, given the excess demand to migrate to these centers, indicated by their relatively low unemployment rates and high wages. The large decline in Lodz and the very low levels of housing construction in Katowice are very notable. It is interesting to note that some of the more rural regions of the countries—e.g., Bialystock—appear to have been able to maintain a relatively high level of housing construction. It would be interesting to investigate whether this may be due, in part, to private housing investment by temporary migrants working abroad.

Figure 11: Trends in housing construction by voivod, 1991-1998

Change in the number of dwellings per 1000 population
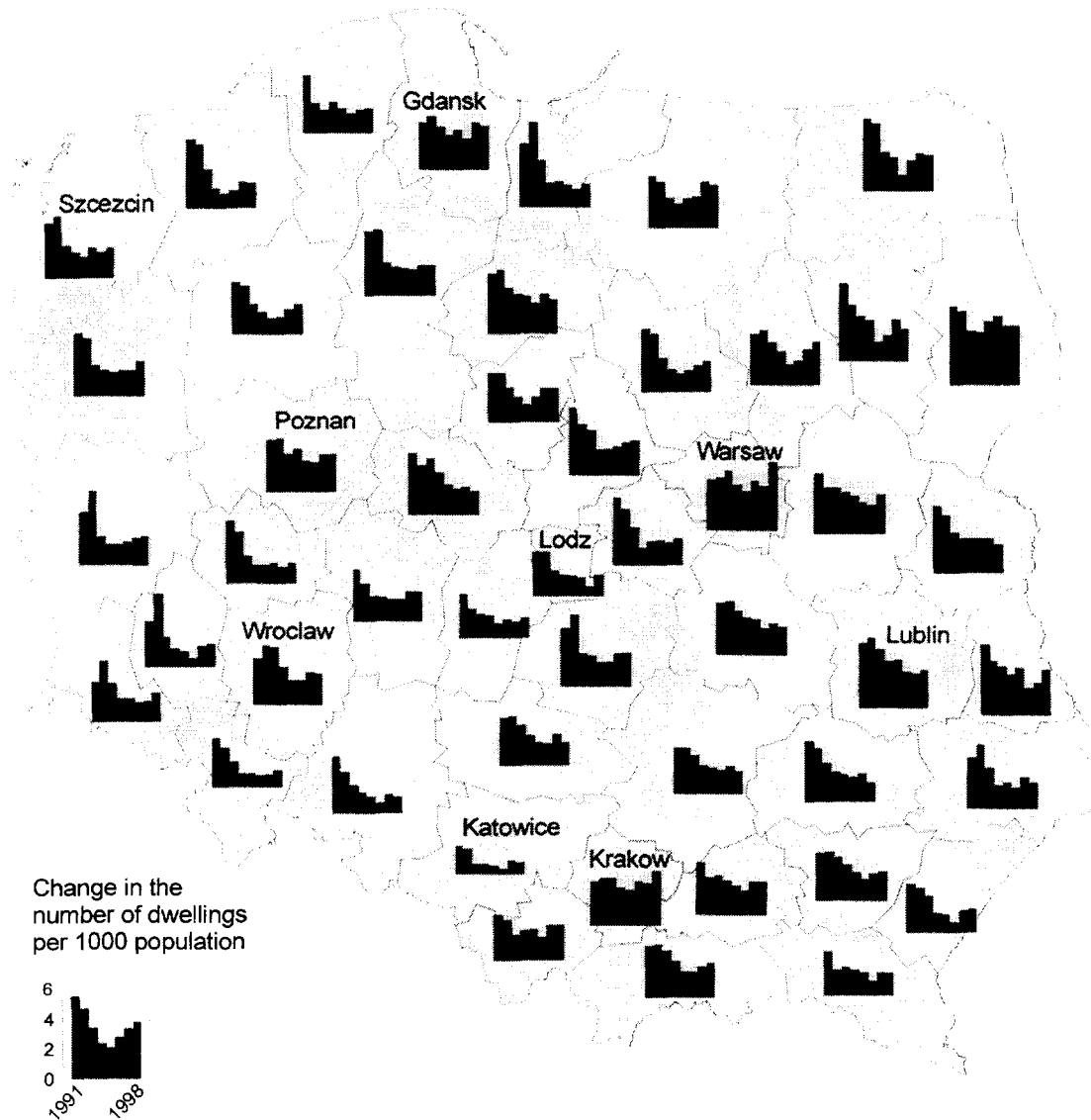
This brief survey of the housing sector leaves two questions. What is inhibiting the functioning of the housing market, even relative to the situation before transition? Second, as a research question, can we directly link decreased migration to housing market shortages and show that there are voivods with strong excess demand for housing? The first question has been addressed by a variety of writers, for example Blunt and Muziol-Weclawowicz (September 1998).

To help answer the second question, Box 6 shows that migration responds to the usual wage and unemployment conditions. However migration is affected by housing availability. That does suggest that housing shortages are in part responsible for choking off needed increases in agglomeration.

Box 6: Housing Availability and Voivod Growth

Regression Results for Net Voivod Migration

	ln(1993 voivod avg. wage)	1993 voivod unemployment rate	1994 urban dwelling units ('000) / 1994 urban population	R^2
net inter-voivod migration	8427[**] (1799)	-99.8[**] (27.0)	16,230,596[**] (8,279,066)	.638

Standard errors in parentheses. **significant at 5% level. Constant term not reported.

The first regression examines net inter-voivod migration in 1994 (data for years between 94 and 98 are not available). People migrate to regions with higher wages (1993) and lower employment (1993). But an important variable is the availability of housing : the number of dwelling units in urban areas in 1994 divided by urban population. A standard deviation of that variable is .0000195. Thus a one standard deviation increase in dwelling units per population raises voivod net migration by 316, about 20% of a standard deviation of the migration variable.

Housing availability appears as though it could be a key determinant of migration. This would suggest that the shut-down in construction is inhibiting market adjustment, especially migration, that would lead to more efficient urban agglomerations. To really explore this topic would require more detailed data on migration over the transition time period, combined with data on housing completions (as opposed to the above data on housing stocks).

Implications

Poland has a low degree of urban concentration on an international scale, having overall relatively small cities. With transition, the introduction of market forces, and the transformation of the economy into increased service production and rearrangement of priorities in the industrial sectors, one would have expected considerable population movements. Regions would have shifted production patterns and population moved in response. With the market emphasis on localized scale externalities, the extent of urban agglomeration would have risen. Instead population movements, movements of cities through the size distribution, and urban agglomeration processes have stagnated. The question is why? Some possibilities come to mind. One is economic depression in cities relative to the countryside. This contradicts the overall picture of what is happening in Poland, with agriculture stagnant since the early 1990's. A commonly cited explanation involves the urban housing market and indeed the already extremely tight Polish housing market has tightened further since transition, with construction rates plummeting. These issues are explored further in the following section on regional patterns of economic activity and employment.

II.   Economic sector transformation and growth

Introduction and summary

As a former Soviet bloc country, we expect Poland will differ from market economies in its economic geography in significant ways. This note explores the extent to which this is the case, how with transition the economic geography is changing, and what on-going peculiarities stand out. Key findings are:

1) Manufacturing and agricultural activity are spatially concentrated, as expected. But services are also fairly concentrated, which is unusual. Services are generally not traded across regions, so they command similar shares of employment across regions. In Poland, there are unusually high variations in service sector shares of total employment across voivods.

2) Manufacturing is spreading out with the introduction of market forces. There is convergence both in the sense of mean reversion and declines in the variance of employment across voivods. Location decisions may be responding more to voivod comparative advantages, growing in certain low employment areas and contracting in some high employment areas.

3) The concentration in service sectors is increasing. There is also general divergence of employment patterns with larger centers growing more quickly than smaller ones—a very unusual finding. While Warsaw may attract certain financial and specialized business services that are typically found in the largest metro areas, that does not explain general divergence. Nor is divergence simply replacement in former large manufacturing centers or areas of high unemployment. It is general. When the national expansion of the service sector stabilizes, this pattern should revert to one of convergence, where smaller centers will start to grow faster than larger ones.

4) Voivod specialization is less than expected for a former planned economy. Specialization is also declining, so that today at the voivod level there is relatively modest specialization. Given the localization benefits of own industry specialization, it is surprising, perhaps even alarming, that industries have not started to reconcentrate. One of the reasons may be limited labor mobility, inhibiting specific skill workers from reconcentrating in areas that have a comparative advantage in their area of productive skills.

Aspects of the economic geography of Poland

There is a consensus that, prior to transition, Poland like other ECA countries was over-industrialized. As a result, manufacturing employment fell by about 25% from 1986 to 1995, before stabilizing. Growth was in the service sectors, such as retailing, finance, and business and real estate. Box 7 below reveals that service sector growth is continuing, with large expansions from 1994-1998 in the hotel and restaurant, finance and business service sectors. This change in national economic sector composition has differential effects across region. To explore that, we discuss regional concentration and then regional specialization, examining changes in these with transition.

Box 7: Industry Growth and Concentration

Industry Growth and Inter-industry Concentration Differences

	Agric-ulture	Manu-facturing	Trade	Finance	Hotels, Restau-rants	Real Estate, Business Services
1994-1998 national employment growth	.075	.0094	.113	.261	.298	.420
national concentration index: *differential* from manufacturing	.082	[.053]*	-.034	-.016	-.042	.002

* The base level average concentration index for manufacturing industries.

For an industry the index of national concentration is the sum over 49 voivods of squared differences of the share of the voivod in national employment of that industry from the voivod's share of total national employment. For an industry, if each voivod's share of its national employment mimics the voivod's share of total national employment, the index is zero. The industry is perfectly spread out, or deconcentrated. As an industry's spread of employment starts to deviate from the general spatial spread of employment, the index rises. At the limit the index can approach 2, when an industry is found in just one region whose share of general national employment is miniscule. Then the industry is perfectly concentrated. See Ellison and Glaeser (1997) for details.

In row 2, the numbers are how much each industry's concentration index is higher or lower than the one for manufacturing which averages .053. The results are from a regression pooling the 1994 and 1998 indices of concentration of each of the 49 2-digit industries. Controls in the regression, which has an R^2 of .55, are a 1998 year dummy (insignificant), national employment in each industry (for either 1994 or 1998), and dummy variables for 11 of the 1-digit industries (i.e., all 23 2-digit manufacturing industries in each of 1994 and 1998 get one dummy variable for manufacturing). Industry concentration declines significantly with national employment. Controlling for national employment, agriculture is the most concentrated industry. It is followed by manufacturing, public administration, and business services. As is the case in most economies, trade, hotels and restaurants, and finance are less concentrated.

Row 1 of the table enumerates what we know already. Manufacturing has stagnated in Poland, while the service sector has expanded. The table shows two oddities. First is the expansion of agriculture which we will suggest below could be due to restrictions on labor mobility. The second oddity concerns concentration in services. In general in more developed economies as the table suggests manufacturing is more concentrated than finance, hotel, and trade services. However in Poland real estate and business services are as concentrated as manufacturing. In fact once one strips away real estate services, sectors such as renting of machinery and equipment, computer services, R&D, and other business activities are highly concentrated. Some seem for the moment to be more confined to Warsaw.

Regional concentration

Because of agglomeration economies and natural resource locations, economic sectors are unevenly distributed spatially. Figure 12 shows how the sectoral composition of economic activity varies across voivods in 1998. Figure 13 shows for each sector its share of total voivod employment— and thus its relative importance in the regional economy—as well as the sector's employment growth rate for the 1994-98 period. In developed economies agriculture and manufacturing tend to be the more concentrated industries spatially, with the latter concentrating both to exploit scale economies in production and to have access to natural resource deposits.

Figure 12: Employment by major sector, 1998

Employment
(thousands)

200

100

0

■ Agriculture
■ Manufacturing
■ Trade
▨ Finance
▨ Services
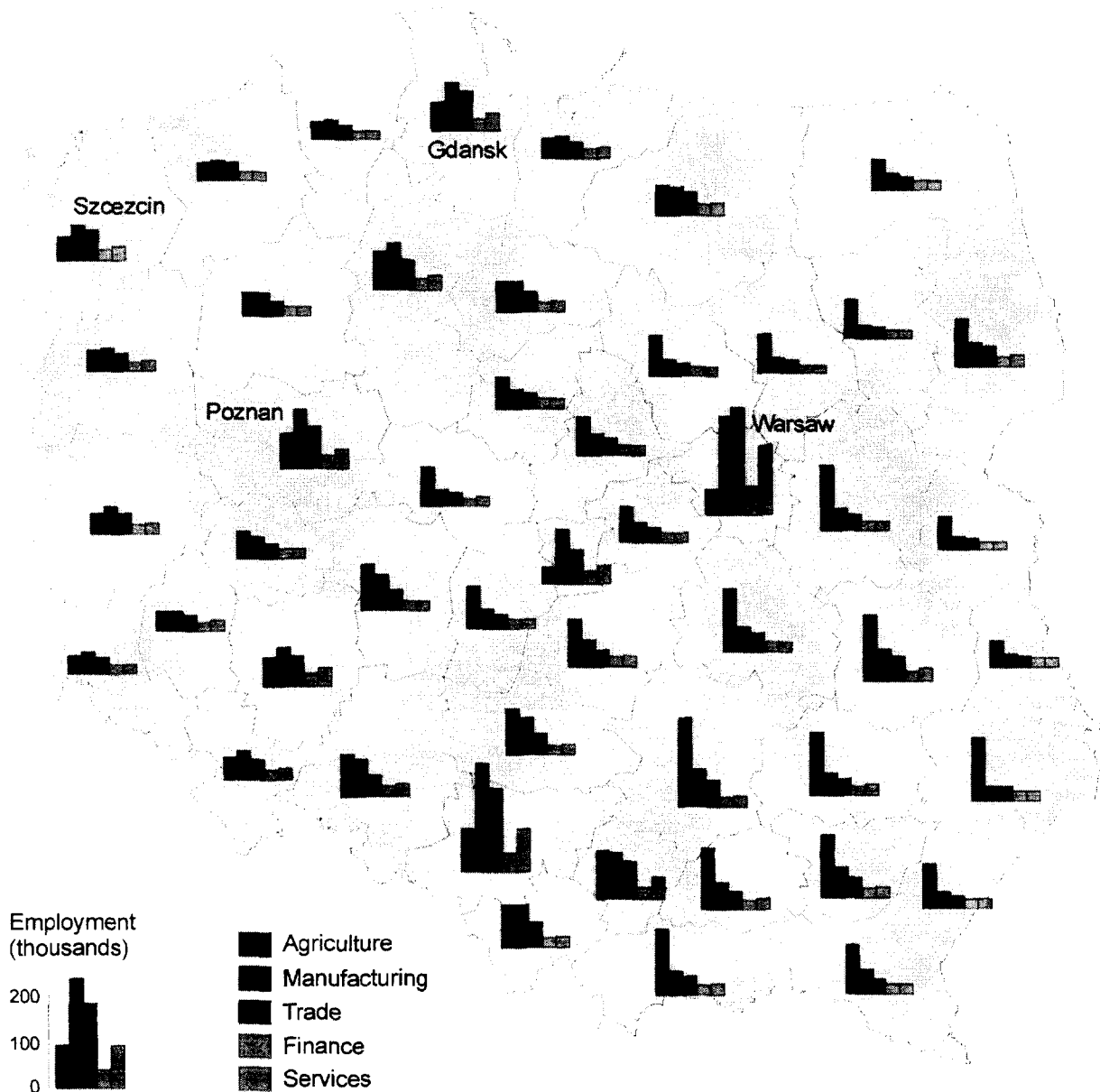
Figure 13: Sectoral employment shares and growth rates

Sectoral share of total voivod employment 1998 (percent)

Sectoral employment growth 1994-98 (percent)

Agriculture

3.8 - 15
15 - 30
30 - 45
45 - 60
60 - 63.9

Manufacturing

7.8 - 12.3
12.3 - 15.9
15.9 - 19.5
19.5 - 22.8
22.8 - 30.7

Trade

6.7 - 8.6
8.6 - 10.3
10.3 - 13.2
13.2 - 15.8
15.8 - 21.3

Finance

1.1 - 1.3
1.3 - 1.7
1.7 - 2.2
2.2 - 2.9
2.9 - 4.3

Services

1.2 - 2.2
2.2 - 3.5
3.5 - 5.2
5.2 - 7.0
7.0 - 12.9

< -15
-15 - -10
-10 - -2.5
-2.5 - 2.5
2.5 - 10
10 - 15
15 - 30
> 30
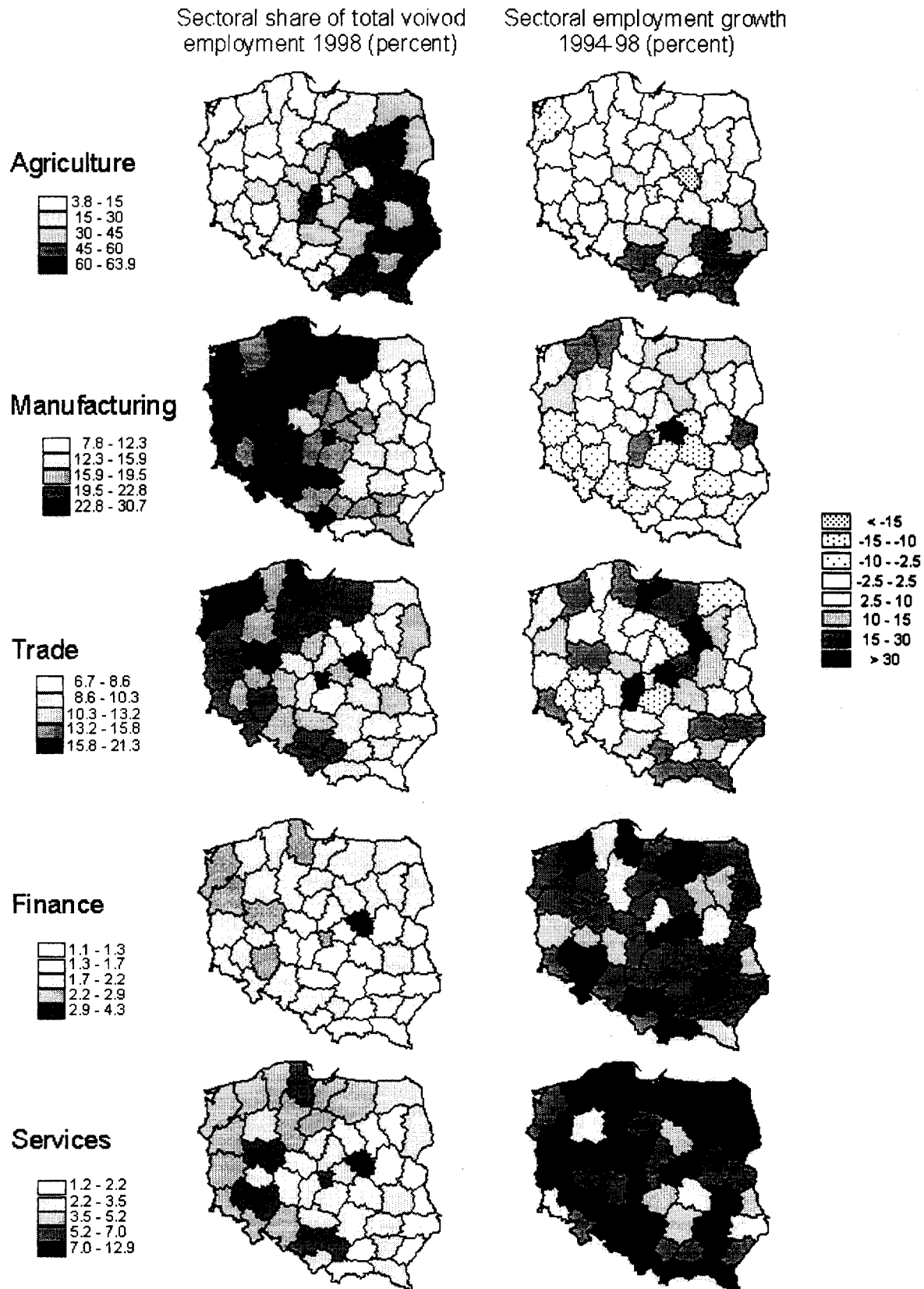
As Figure 13 indicates, this is the case in Poland where agriculture tends to be in the farmlands of the East and heavy industry concentrated in the West and South-West near coal and iron ore resources. Moreover there is considerable variation in the sector shares across voivods, ranging from 4 to 64% for agriculture and 8 to 31% for manufacturing.

In contrast, in developed countries, trade (retail and wholesale), finance, and business services tend to be more ubiquitous (see Kolko, 1999). Unlike manufactured and agricultural products, many service activities are not traded across cities—they are produced and consumed locally. In Poland, from Figure 13 there is considerable variation in service shares in total employment across voivods. While the variation in trade is less than in manufacturing and agriculture, ranging from 7 to 21%, it is still extremely high. In the USA for example, the share of trade in state employment in 1980 lay between 17.6 and 23.7% across all states. In Box 7 above, which presents concentration indices, it is the case that agriculture and manufacturing are more spatially concentrated than trade, hotels and restaurants, and financial services in Poland. However real estate and business services are as concentrated as manufacturing. Moreover, as we will see, concentration in all these service sectors is increasing. Rather than widespread development of services sectors, there is increasing concentration.

Transition has brought with it spatial reorganization of production. The biggest initial shock from transition was the initial cut in manufacturing employment noted earlier. After manufacturing bottomed out around 1994, since then, from Figure 13, it appears that manufacturing growth is highest in voivods with relatively little manufacturing and slowest in the dominant centers. That suggests manufacturing is spreading out. These contrasting processes where manufacturing is spreading and services are concentrating are of considerable interest.

We start by looking at "mobility" of manufacturing employment. In Box 8, prior to transition, there was limited mobility of manufacturing shares among regions, in the sense that small manufacturing voivods grow at about the same rate as large ones. After transition, Poland reverts to a traditional market pattern in countries where there is significant mean reversion (Blanchard and Katz, 1992). Small centers move up the size distribution and large ones move down. Mean reversion is a standard phenomenon, in response to sector and location shocks.

Moreover in Poland, manufacturing spread beyond traditional centers, presumably in response to market forces emphasizing inherent voivod comparative advantages.[1] The most rapidly declining centers are traditional manufacturing ones predominately in the South-West. Rapid growth centers include areas around Warsaw (Skierniewice) and Gdansk (Slupsk and Elblask). It is possible that these represent the start of development of satellite cities to these metro areas. In interpreting these growth numbers, especially for the voivods around Gdansk, we must recognize that some "growth" could be recovery in high unemployment areas, although conditional convergence regressions suggest unemployment in 1994 does not explain any variation in voivod manufacturing employment growth rates from 1994 to 1998.

---

[1] When we say "spreads", the term could be misleading. Given very restricted population and labor force mobility across voivods, it is not that manufacturing is moving from one voivod to another per se. Rather it is that manufacturing employment in established manufacturing centers is moving into other local industries, while in growing manufacturing centers, local labor is switching from other industries into manufacturing.

Box 8: Manufacturing Mobility

Manufacturing Employment: Convergence and Variances

	1980-92	1992-98	1994-98
Annual Speed of Convergence	.0013	.033*	.016*

	1980	1992	1998
Variance of Relative Employment	78.2	95.1	34.5

The annual speed of convergence uses industrial employment data by voivod for 1980 and 1992 and manufacturing employment data (i.e., no mining) for 1994 and 1998. The annual speed of convergence is from a regression ln (employ (t)) − ln (employ (t-1)) = α-β ln (employ (t-1)). An asterisk indicates a coefficient significant at the 95% level. The variance of relative employment is the variance of $X_R / \overline{X}$, where X_R is the voivod value and $\overline{X}$ the average across voivods.

A measure of the degree of mobility in a given time period is the speed of convergence. Here that means the speed of reversion to the mean – how quickly small employment centers move up the distribution and large ones move down. Prior to transition, manufacturing displayed little mobility and mean reversion, so big and small employment voivods grew at the same rate on average. Katowice, in particular, was a strong performer in the 1980-92 time period. Post-transition Poland starts to look like market economies with a considerable degree of mean reversion. Some small centers grew quickly while some large ones, especially Katowice, declined. The 92-98 speed of convergence is very large, while 94-98 is more settled. 1992 is the bottom of the economic cycle in the transition period.

Not only did mobility speed up post-transition, but the variance of overall relative manufacturing employment fell dramatically. This is real employment convergence. Small centers grew quickly and very large ones declined, spreading manufacturing employment more evenly in Poland.

In contrast to the spreading out of manufacturing, service sector activities appear to be concentrating (Box 9). The large increase in concentration indices might be explained by dramatic growth of one or two established centers. As we will see there is very high concentration of certain traded services in Warsaw. But what is happening is more than this. There is general overall divergence of employment patterns for these industries, with, in general, established centers growing more quickly than smaller centers, as indicated in Box 9. A series of graphs in the Appendix shows for each of these industries the plots of local sectoral employment growth against base period local sectoral employment. Manufacturing shows the expected negative correlation, but for services the slope is positive, indicating divergence. Points 1 and 14 are Warsaw and Katowice.

General divergence like this is extremely unusual. This fast growth of larger centers compared to smaller ones is not explained by larger centers having had initial high unemployment or high manufacturing employment. Conditional convergence regressions still show divergence, and initial unemployment rates

or manufacturing employment levels have no explanatory power and no consistent effect. In general there is universal economic sector convergence, or mean reversion across regions, except in circumstances like this, where there is a major transformation of the economy and local industrial bases. Once these sectors have fully expanded, we would expect to see a shift back to a pattern of mean reversion in these industries as well. That is, growth will slow in the larger centers and pick-up in smaller ones.

Box 9: Concentration of Services

Concentration Indices and Divergence

	Retail Services	Finance	Real Estate & Business Services
Concentration Index:			
1994	.0012	.0054	.022
1998	.0025	.0073	.026
Speed of Divergence 1994-1998	.019*	.012*	.002

The concentration measures are discussed in Box 7 and the speed of convergence/divergence in Box 8. For the latter, an asterisk indicates the coefficient is significant at the 95% level. Finance and real estate-business services are 1-digit industries. Retail is the (major) 2-digit component of trade.

The concentration indices for retail, finance, and real estate-business services rose by 108%, 35% and 18% respectively. In contrast the concentration index for overall manufacturing industries fell by 12% from 1954-1998, indicating the general spread of manufacturing. In the last row of the table, while in general across space there is "convergence" or mean reversion in employment, during this time of economic adjustment in Poland, there is divergence. Established service centers on average are growing much more quickly, led by Warsaw in the retailing and finance sectors, than small centers.

Having looked at overall concentration, we now take a more detailed look at the voivods of most intense concentration, especially Warsaw and Katowice. Box 10 reiterates that traditional heavy industries tend to be spatially concentrated, both to exploit agglomeration economies and to be near resource deposits. But it also tells us that the high tech sector and, partly related, exportable services sector (R&D, computer and certain business services) are concentrated in Warsaw. Overall manufacturing has no dominant sub-sector in Warsaw and is stagnant. Warsaw appears to be the heart of modernization of the Polish economy and in an economic sense the primate city in Poland, offering the highest wages in all sectors. It also has a low unemployment rate, under 3% in 1998, when the rest of the country had a rate over 10%. The surprise, at least until one considers the constraints on labor mobility in Poland, is that Warsaw is not growing more rapidly.

Katowice, which is considered the primate city according to UN definitions, offers an interesting contrast. It is the heavy industry center of Poland, an odd position for a primate city in a somewhat developed economy. Not surprisingly, heavy industry has declined since transition. Katowice lost 25,000 jobs in basic metals manufacturing between 1994 and 1998. Where did these people go? Katowice has a

Box 10: Spatial Agglomeration and Concentration

Regions Which Have Over 20% of National Employment of an Industry

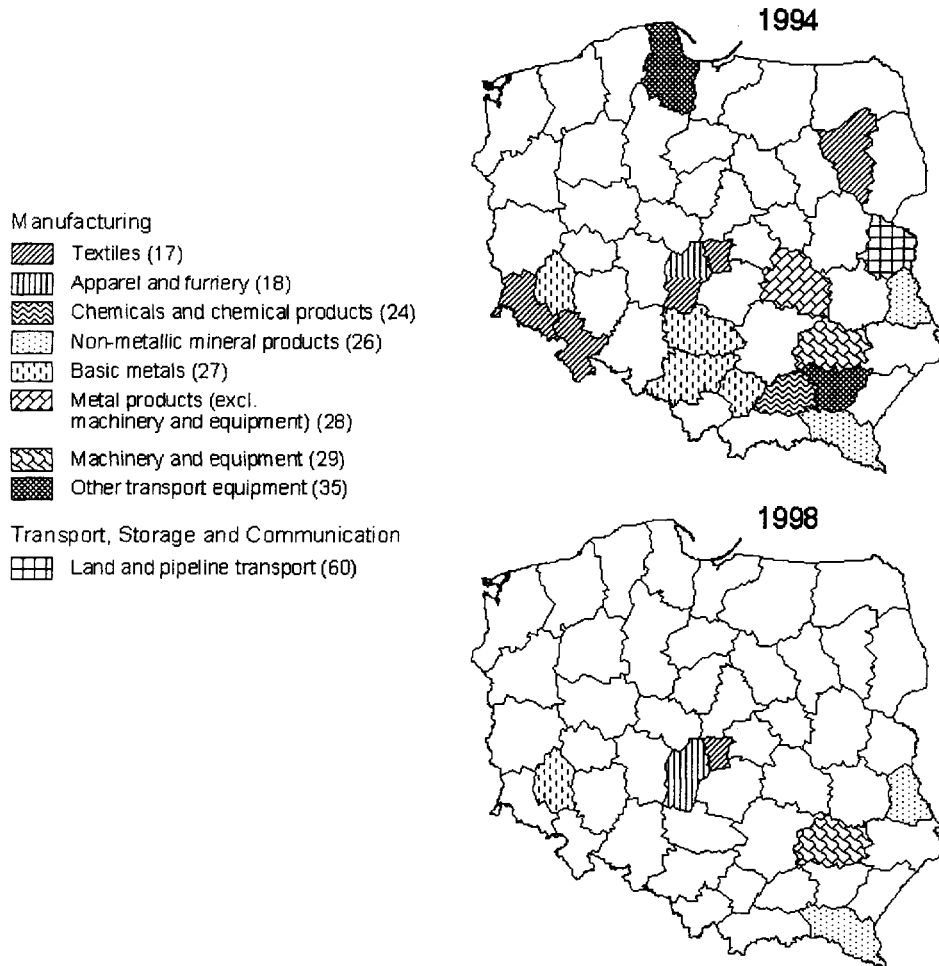| Region	Industry	1994 share of national employment	1998 share of national employment
Warsaw	publishing	.38	.36
	computers	.53	.43
	communications equip.	.35	.37
	instruments	.28	.22
	computer services	.28	.29
	R&D	.46	.50
	business services	.20	.22
	membership organizations	.21	.57
	recreations activities	.20	.21
Katowice	petroleum products	.28	.27
	basic metals	.41	.35
Krakow	equipment rental	.33	.09
	tobacco	.29	.30
Lodz	textiles	.22	.22
Opole	petroleum products	.29	.30
Plock	petroleum	.29	.30
Rzeszow	non-motor vehicle transport equip.	.25	.26

The table shows that seven voivods have very high concentrations of industrial activity. Some of these are centered around natural resource extraction or processing (petroleum, metals); some represent the exploitation of agglomeration economies (textiles, transport equipment). Warsaw clearly is the high tech, R&D and business services center of the economy, as well as publishing.

relatively low unemployment rate and relatively low wages (despite being the largest urban agglomeration). Katowice has had strong growth in finance and business services, although the size of these sectors is much smaller than in Warsaw. One of the fastest growing major sectors in Katowice is agriculture, which gained 20,000 jobs from 1994 to 1998. Food processing also expanded significantly. In fact Katowice is the voivod with the highest growth in agricultural employment from 1994-98 in Poland. This is not de-urbanization; the urban area of Katowice continues to grow slowly in population and as just noted is becoming more service oriented. But it may suggest that some workers have moved back into agriculture, as industry has declined. The choice to go back to agriculture may reflect the inability of skilled manufacturing workers to move to voivods with better job opportunities for them.

Regional specialization

So far we have examined industrial concentration. Specialization is a different cut on geography. It deals, as in Figure 13, with sector composition of a voivod, while concentration refers to how much of a sector's activity is concentrated in one or a few voivods. For many manufactured activities, specialized voivods are often also centers of national employment concentration for that industry. But very diverse centers such as Warsaw are home to certain concentrated industries as in Box 10, which however claim a small portion of Warsaw's overall employment. Here we look at industrial sectors in which voivods specialize, with reasonably high proportions of their employment in just one industry.

Figure 14: Voivods with large specialization in selected sectors

Manufacturing
- Textiles (17)
- Apparel and furriery (18)
- Chemicals and chemical products (24)
- Non-metallic mineral products (26)
- Basic metals (27)
- Metal products (excl. machinery and equipment) (28)
- Machinery and equipment (29)
- Other transport equipment (35)

Transport, Storage and Communication
- Land and pipeline transport (60)

In market and planned economies, for somewhat different reasons, there is a reasonable degree of specialization across cities and regions in manufacturing production. We don't have city data on Poland, so we examine non-agricultural employment to try to get a sense of production patterns in urbanized areas in voivods. Since voivods in Poland are small, comparable to a reasonable size USA. county, they are typically dominated by one urban area. While some planned economies had intense local specialization, that was not the case in Poland. In Figure 14 we show voivods which are fairly specialized and their

industry of specialization for 1994 and 1998. The map indicates voivods in which an industry's share of that voivod's non-agricultural employment exceeds 5% and this share is at least three times the share of the industry in national non-agricultural employment (so that we do not just list industries with big national shares of total employment).

Box 11: Voivod Specialization

(a) Degree of Voivod Specialization

	1994	1998
all non-agricultural employment	.0050	.0039
manufacturing employment	.043	.036

(b) Determinants of Specialization in Non-Agricultural Employment

ln (non-agricultural voivod employment)	year = 1998	N	R^2
-.0015*	-.00096*	98	.26
(.00029)	(.00038)		

In part (a) the index of specialization is the sum over 48 two-digit non-agricultural industries (including construction, hotels, public administration, education, and health) for each voivod of the square of the difference between industry 's share of voivod non-agricultural employment and the share of industry in national non-agricultural employment. If the voivod mimics national composition of employment by sector, the voivod is perfectly diverse and the index has a value of zero. As voivod employment composition starts to deviate from the nation the index rises. At the limit the index approaches two, when a voivod has all of its employment in one industry and most of national employment is completely specialized relative to the nation. The index for manufacturing is based on the 23 2-digit manufacturing employment shares in all-manufacturing.

In part b, the index for each voivod for both 1994 and 1998 is regressed against total voivod non-agricultural employment for that year and a dummy variable if the year is 1998. Terms such as an interaction between 1998 and voivod employment and the scale of agriculture were insignificant.

Between 1994 and 1998, the average of the index of specialization in non-agricultural employment by voivods fell by 22% and for specialization in manufacturing employment fell by 16%. In 42 of 49 provinces the index of non-agricultural employment specialization fell, and in 41 of 49 provinces the index of manufacturing specialization fell. The regression indicates that the degree of voivod specialization declines with voivod employment scale, a standard result. Bigger local economies are more diverse. The regression also confirms that controlling for voivod scale, regional specialization declined in Poland significantly in just four years. The decline in specialization for 1998 relative to 1994 of .00096 represents a 20% decline from the mean 1994 value.

The industries of specialization are the usual manufacturing ones—textiles, apparel, metals, machinery, transport equipment, and so on. These are industries subject to localization economies, where standardized production in market economies tends to be located in cities specialized in that product. But in Poland no voivod is intensely specialized with even 10% of its non-agricultural employment in just one industry. That is very unusual (Henderson, 1988). Moreover there has been a dramatic decline in voivods

classified as specialized from 1994 to 1998. This reflects a general decline in regional specialization, a puzzling aspect of Poland's geographic development.

In Box 11, we show that specialization is related to voivod employment size, with the degree of specialization declining with scale, a standard finding. We also show that overall specialization and manufacturing specialization in voivods declines sharply from 1994 to 1998. While moving from a planned to market economy might be associated with declining local specialization—the elimination of the one factory town—Polish voivods were never highly specialized. Since transition one would expect much more rearrangement and reconcentration, as opposed to simple overall declines in the degree of specialization. Transition should involve reorganization as regions shift employment towards their sectors of comparative advantage. With that we would expect re-agglomeration in manufacturing, in order to properly exploit scale economies. However, in Poland re-agglomeration may be hindered by the lack of labor mobility. So skilled workers in one manufacturing sector in an established but declining voivod are unable to reconcentrate in voivods that are starting to expand. Thus expansion of those voivods into specialized centers is inhibited. Instead workers shift into other local activities such as agriculture, certain service activities, become unemployed, or work abroad for a period each year.

III. Demographic patterns

Introduction and summary

In this note, we discuss a number of interesting demographic patterns in Poland. Population dynamics both influence and are a reflection of the characteristics of labor and housing markets. The observations discussed here agree with our findings elsewhere that significant barriers appear to hinder dynamic adjustments in population distribution and local economic activity.

1) Poland's population has been stabilizing at around 38.6 million with fertility rates at about replacement level. While rural population has been near constant since 1946, urban population increased significantly. However, the proportion of the population living in urban areas is still fairly low at 62% compared to most industrialized countries.

2) Mortality among males is very high. This is largely a reflection of a high rate of cardiovascular diseases. Although male mortality rates have been improving from a low in 1991, the difference between male and female life expectancy is still quite high.

3) Poland shows very distinct sex ratio differentials between urban and rural areas. There tend to be more females than males in urban areas, while the reverse is true to an even greater extent in rural regions. These differences appear to have declined slightly over the last decade. It is not clear, however, whether this recent trend toward a more even sex ratio in urban areas is due to social or economic changes, or whether this is another reflection of barriers to migration that may be limiting the influx of women in young working age into the cities.

4) Population projections predict future demographic dynamics due to lifestyle changes similar to those observed in other countries. The trend toward declining family sizes and an increase in single person households will lead to a considerable increase in the demand for housing. This will likely put further strains on an already very tight housing market.

Main demographic trends

The total population of Poland was 38.7 million at the end of 1998. In 1946, Poland's population stood at 23.8 million of which only 32.6% lived in urban areas (Figure 15). By 1967, the population was evenly divided between urban and rural. In 1998 about 62% of population was urban. Over the entire period, the rural population stayed approximately constant between 14.5 and 16 million, while urban population increased rapidly. Urban growth rates exceeded 2% for most years until 1980. Since then they have decreased steadily and are now very close to zero. While declining natural population growth rates are not unusual for industrialized countries, demographic patterns in Poland show a number of unusual characteristics that are discussed below.

**Figure 15: Population in Poland 1946-1998**
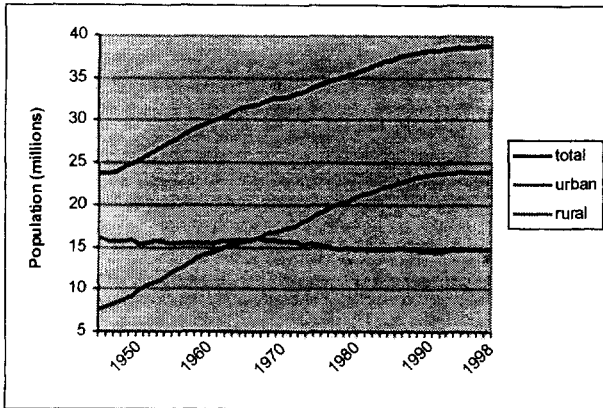
Excess male mortality

The crude death rate in Poland was 9.7 in 1998, which represents a slight decrease from a high of 10.6 in 1991. Life expectancy at birth was 68.9 for males and 77.3 for females (Table 6). This is about 5-8 years less than in some Western European countries such as France, Switzerland and Sweden. Since 1960 female life expectancy increased 6.7 years compared to 4 years for males. This points to a higher relative mortality among men.

Table 6: Life expectancy at birth

Year	Female	Male
1960	70.6	64.9
1970	73.3	66.6
1980	74.4	66.0
1990	75.5	66.5
1998	77.3	68.9

Figure 16: Life expectancy at age 45
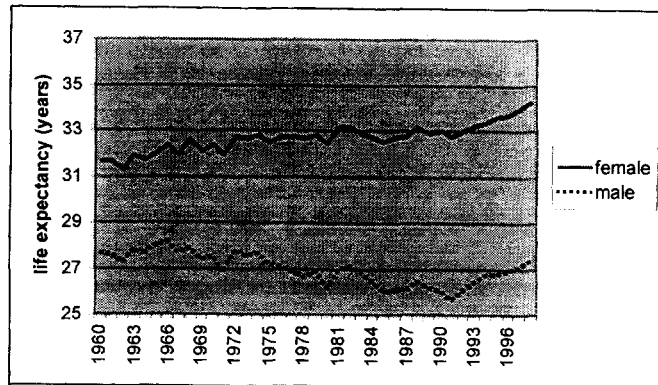
This high mortality can be partially attributed to a high incidence of cardiovascular diseases—estimated to account for 50% of all deaths—caused by high levels of alcoholism, smoking and bad nutrition among working age adult males. Industrial pollution may contribute to this high mortality. AsFigure 16 shows, life expectancy for 45 year old males was actually lower in 1998 than it was in 1960, although it has been improving from a low of 25.6 in 1991.

Figure 17: Life expectancy at birth, deviation from national level

Female (77.34)

Male (68.87)

years

☒ -1.68 - -1.5
-1.5 - -0.5
-0.5 - 0.5
.0.5 - 1.5
■ 1.5 - 1.56

years

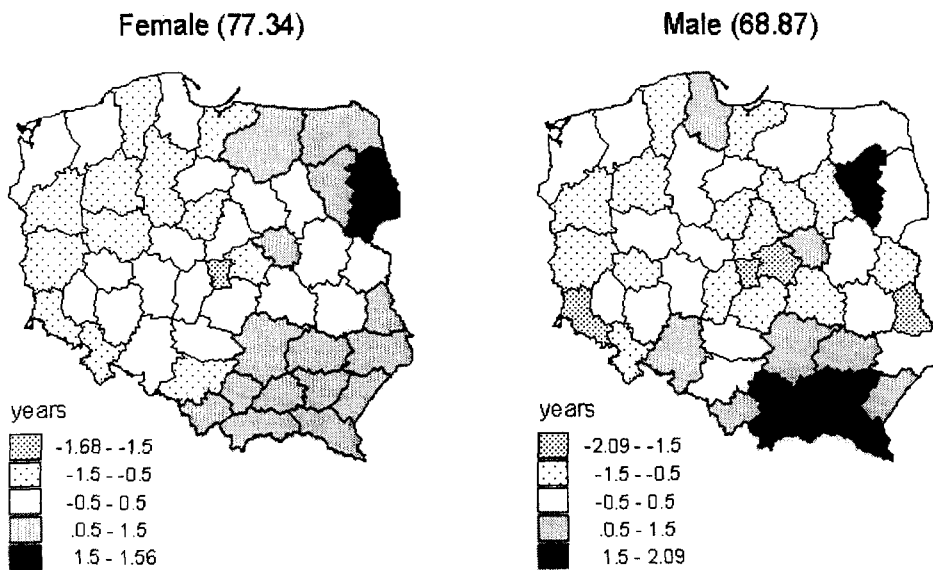☒ -2.09 - -1.5
-1.5 - -0.5
-0.5 - 0.5
.0.5 - 1.5
■ 1.5 - 2.09

Figure 17 shows that life expectancy is generally higher in the rural regions of the southeast and, for females, in the northeast of the country. It is lower in the more industrialized western part of the country, and is lowest for males in the voivods to the west of Warsaw—Skierniewice and Lodz—as well as in Jelenia Gora in the southwest and Chelm in the east. All but the first of these are among the 27 areas identified by the Polish government as heavily polluted areas. For instance, Lodz and Jelenia Gora have some of the highest concentrations of SO2 emissions (Weclawowicz 1996). Figure 18 below shows that life expectancy is increasing everywhere. However, the magnitude of these gains is not uniform although there is no distinct spatial pattern. The maps also confirm our observation that male life expectancy is catching up somwhat from the 1991 low.

Figure 18: Gain in life expectancy at birth, 1991-1998

Female

Male

years

☐ 1 - 2
2 - 3
■ 3 - 4
■ 4 - 5
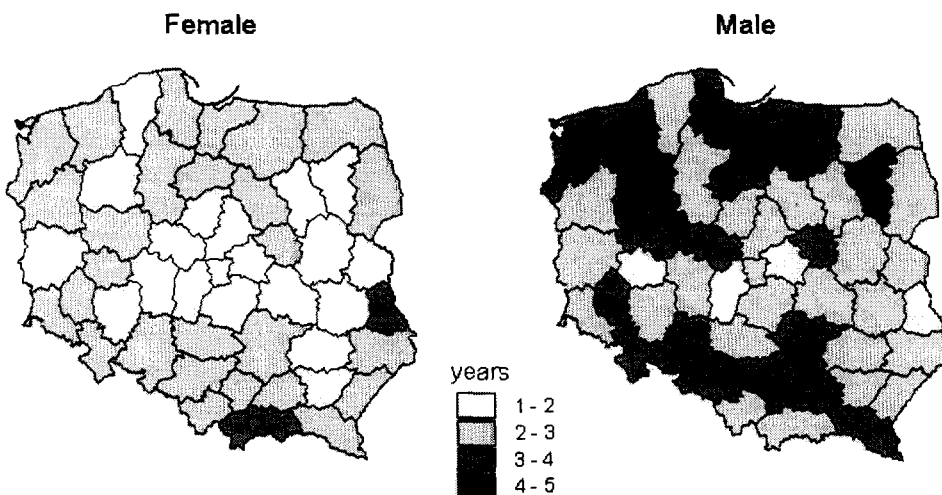
Rural-urban sex ratio differentials

The demographic structure of Poland's population displays some interesting characteristics. Overall, as in most countries, there is a larger number of women than men. The sex ratio, defined by the number of males per 100 females, was 94.6 in 1998. Geographically, however, the patterns are more varied. Figure 19 shows the overall population distribution by sex, age and urban and rural residence. Figure 20 summarizes this information by showing the sex ratios for different age groups for the entire population as well as by urban and rural residence.

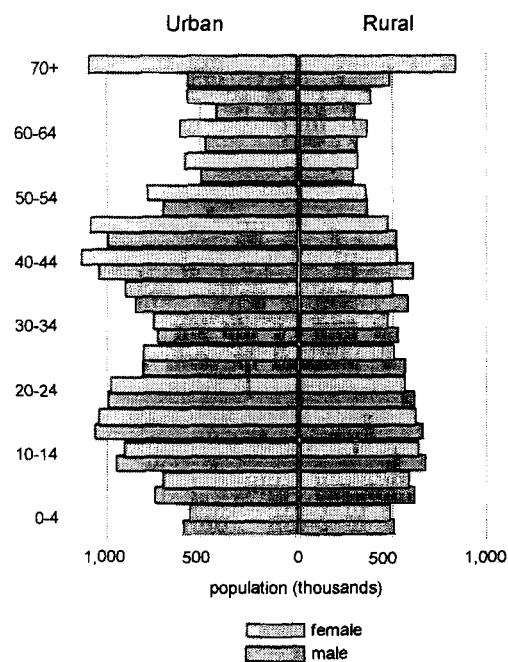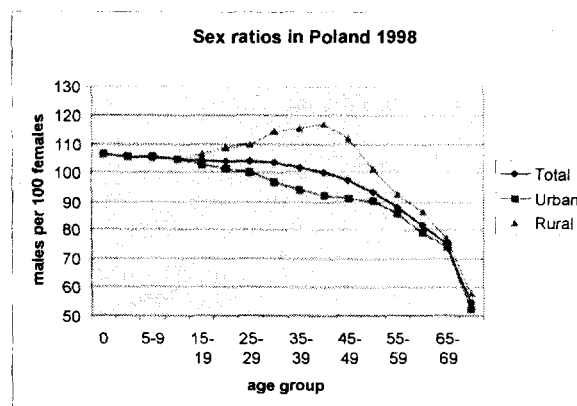**Figure 19: Population by age, sex and residence, 1998**

Figure 20: Population by age, sex and residence, 1998

The charts show large imbalances in sex ratios for adult age groups in urban and rural areas. While the very low sex ratios for age groups above 60 can be attributed to the significantly lower male life expectancy, the large differences in sex ratios between urban and rural areas reflect a more complex pattern. Generally, there are many more women than men in urban areas with the reverse pattern in rural areas. In 1998 there were about 417,000 more women than men aged 20-59 in urban areas. The corresponding deficit of females in rural areas is about 355,000.

Figure 21 shows these patterns in a spatially disaggregated way. There are significantly more males in the rural areas of almost all voivods in the economically active age groups. The reverse is true for females in older working age. These patterns reflect labor migration of young women to urban areas. Sex ratios are lowest in the traditional textile towns, while urban areas that have been dominated by heavy industry show a more balanced distribution. In rural areas, in contrast, men tend to stay to work in the agricultural sector. According to Weclawowicz (1996), these dynamics have serious social and economic consequences as the shortage of women in rural areas has lowered marriage rates and limits the creation and sustainability of family farms.

Figure 21: Sex ratios by voivod, 1998

Urban Rural

20 - 39

40 - 59

males per 100 females

85 90 95 105 110 115

more females more males
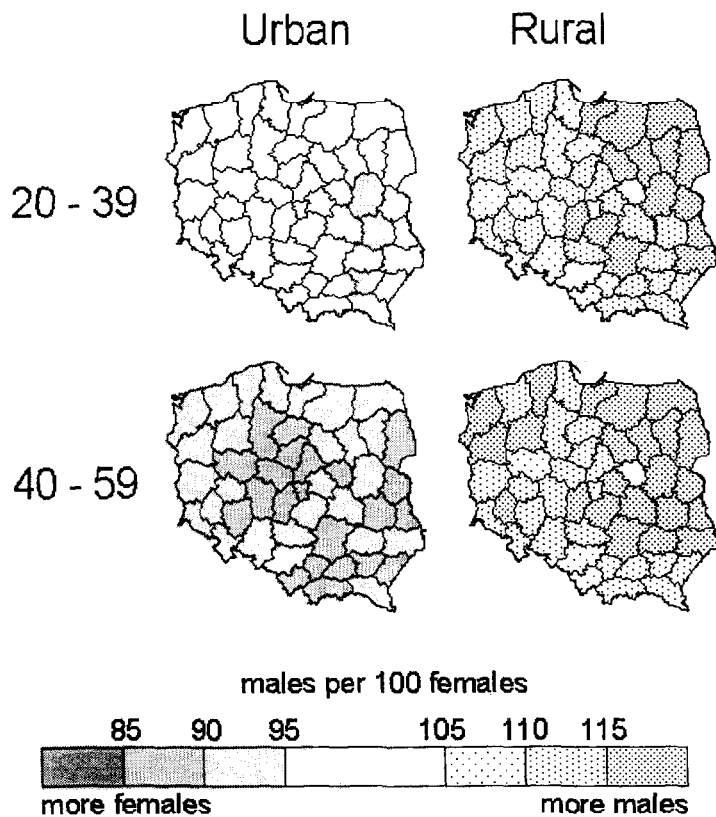
There is some indication, that the large differences in sex ratios may be decreasing in the future. Figure 22 shows the sex ratio differentials between rural and urban areas for three years. In the younger adult age cohorts, the sex ratio differential has been lower in 1998 than in the previous years. This is also reflected in the maps shown previously in Figure 21, where the urban sex ratios for the 20-39 age group are more balanced than those for the older working age group. We do not have any information, however, whether these trends reflect changing social attitudes and economic preferences, or whether this is further evidence of possible barriers to rural-urban migration that we have discussed elsewhere.

Figure 22: Trends in sex ratios, 1990-1998

Sex ratio differentials (rural minus urban)
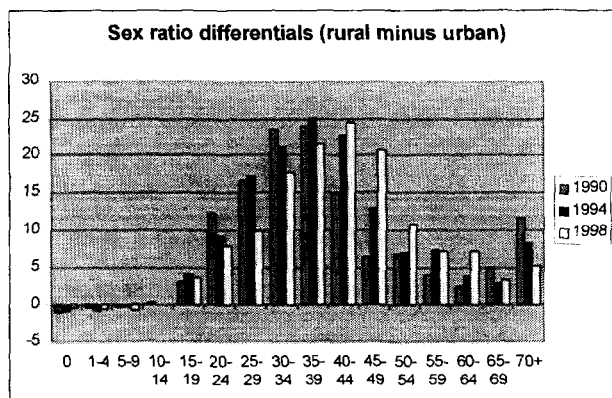
Declining household size

Poland is experiencing similar demographic trends as other countries in Europe (Council of Europe 1999). Declining birth rates will lead to an increasingly older population with a resulting reduction in the proportion of population in working age. Official projections for 2020, which were carried out in 1996, show a moderate increase of the total population to 40.7 million. However, there will be a significant increase in the share of the so-called immobile working age group (men aged 45-64 and women aged 45-59). The proportion of retired persons will increase from 13.7% in 1995 to about 19% in 2020.

Despite the relatively low growth of population the number of households will increase significantly as average household size in Poland is likely to decrease considerably. Smaller families and the increasing number of single households are expected to lead to an increase of the total number of households from 12.5 million in 1995 to 16 million in 2020. Demand for housing is thus going to increase dramatically over the next two decades.

Appendix

Administrative units (voivods) in Poland

Voivod codes used in the following charts

|			
1 Warsaw	14 Katowice	27 Opole	40 Suwalki
2 Biala Podlaska	15 Kielce	28 Ostroleka	41 Szczecin
3 Bialystok	16 Konin	29 Pila	42 Tarnobrzeg
4 Bielsko-Biala	17 Koszlain	30 Piotrkow	43 Tarnow
5 Bydgoszcz	18 Krakow	31 Plock	44 Torun
6 Chelm	19 Krosno	32 Poznan	45 Walbrzych
7 Ciechanow	20 Legnica	33 Przemysl	46 Wloclawek
8 Czestochowa	21 Leszno	34 Radom	47 Wroclaw
9 Elblag	22 Lublin	35 Rzeszow	48 Zamosc
10 Gdansk	23 Lomza	36 Siedlce	49 Zielona Gora
11 Gorzow	24 Lodz	37 Sieradz	
12 Jelenia Gora	25 Nowy Sacz	38 Skierniewice	
13 Kalisz	26 Olsztyn	39 Slupsk	

Convergence/divergence: Graphs of employment growth (see Section II)
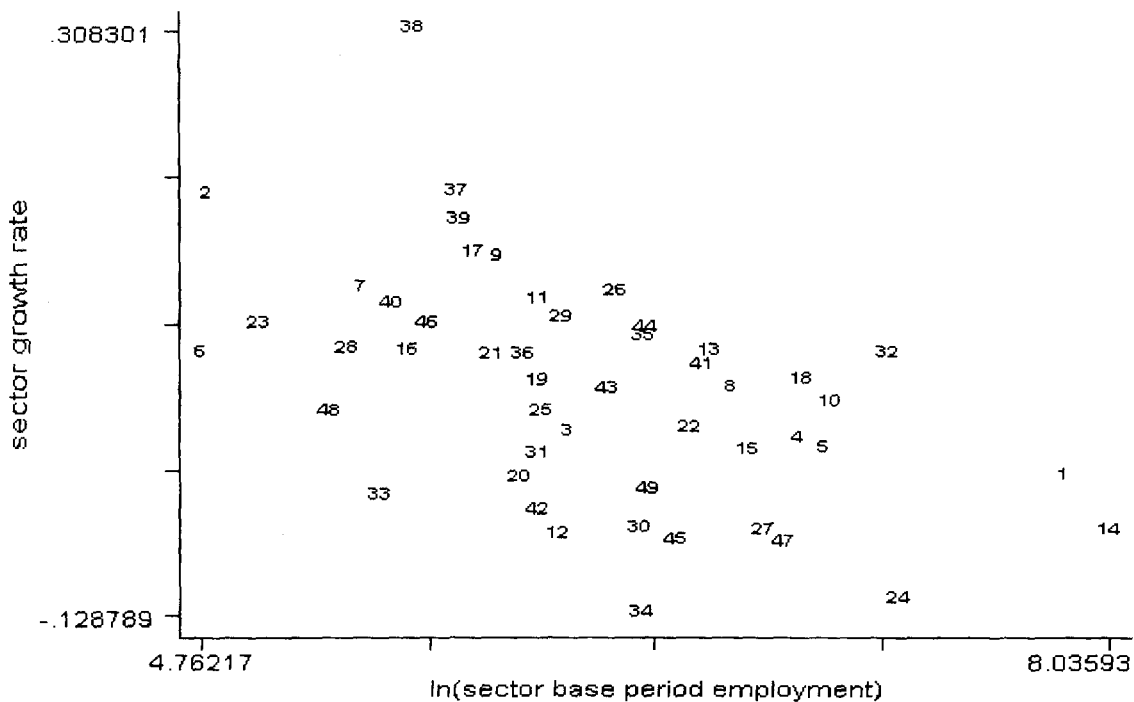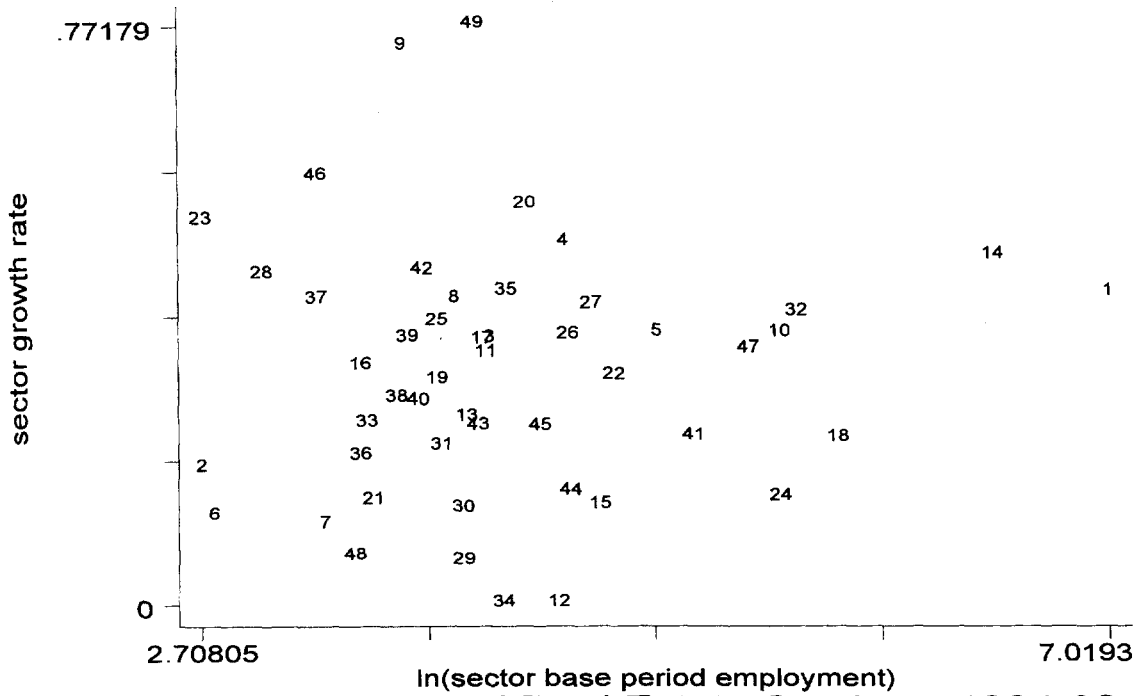

Voivod Growth in Manufacturing Employment, 1994-98

Voivod Growth in Retail Employment, 1994-98
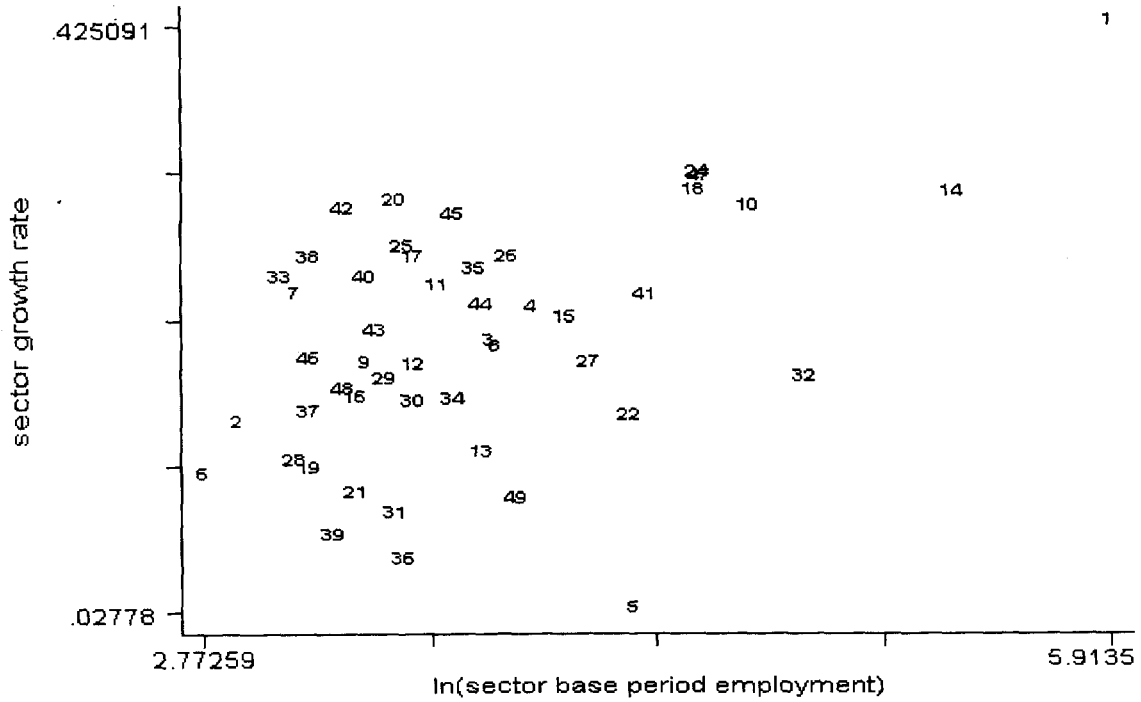
Voivod Growth in Finance Employment, 1994-98

Growth in Business and Real Estate Services, 1994-98

Bibliography

Black, D. and J. V. Henderson (1999), Urban Evolution in the U.S.A., mimeo (September), Brown University.

Blanchard, Olivier Jean and Lawrence F. Katz (1992), Regional evolutions, *Brookings Papers on Economic Activity*, 1, 1-75.

Blunt, Alistair C and Alina Muziol-Weclawowicz (1998), Improved management of the existing stock - the case of Poland, *Housing Studies*, 13, 5:697-711.

Council of Europe (1999), *Recent Demographic Developments in Europe*, Council of Europe Publications, Strasbourg.

Eaton, J. and Z. Eckstein (1997), Cities and Growth, Theory and Evidence from France and Japan, *Regional Science and Labor Economics*, 27, 443-474.

Ellison, G. and E. Glaeser (1997), Geographic Concentration in US Manufacturing Industries: A Dartboard Approach, *Journal of Political Economy*, 105(5), 889-927.

Engfer, Uwe, and Thomas Seng (1997), Differenzierung der Lebensverhaeltnisse in Ostmitteleuropa und Ost-West-Migration (Differentials in living standards in East-Central Europe and East-West migration), *Mitteilungen aus der Arbeitsmarkt- und Berufsforschung*, 30, 3:601-611.

Gabaix, X. (1999), Zipf's Law for Cities: An Explanation, *Quarterly Journal of Economics*, 114, 3:738-767.

Gorzelak, Grzegorz et al. (1999), *Dynamics and Factors of Local Success in Poland*, European Institute for Regional and Local Development and Center for Social and Economic Research, Warsaw.

Henderson, J.V. (1999) The Effects of Urban Concentration on Economic Growth, NBER Working Paper No. 7503.

Henderson, J.V. (1988), Urban Development: Theory, Fact and Illusion, Oxford University Press.

Hoenekopp, Elmar (1999), Economic and labour market development in selected reform countries in Central and Eastern Europe, in: E. Hoenekopp, St. Golinowska, M. Horalek (ed.), *Economic/Labour Market Development and International Migration - Czech Republic, Poland, Germany*, Beitraege zur Arbeitsmarkt und Berufsforschung, Federal Labour Office, Nuremberg.

Kolko, J. (1999), Can I Get Some Service Here: Transport Costs, Cities, and the Geography of Service Industries, mimeo (March), Harvard University.

Kuklinski, Antoni R. (1982), *Space Economy and Regional Studies in Poland*, United Nations Center for Regional Development, Nagoya.

Mayo, Stephen K. and James I. Stein (1988), Housing and labor market distortions in Poland: Linkages and policy implications, Policy Planning and Research Staff Report INU 25, World Bank, Washington, D.C.

OECD (1992a), *Industry in Poland. Structural Adjustment and Policy Options*, Organisation for Economic Co-Operation and Development, Paris.

OECD (1992b), *Regional Development Problems and Policies in Poland*, Organisation for Economic Co-Operation and Development, Paris.

OECD (1994), *Poland*, OECD Economic Surveys, Organisation for Economic Co-Operation and Development, Paris.

Pogodzinski, J.M. (1995), The effect of housing market disequilibrium on the supply of labor. Evidence from Poland, 1989-1990, *Real Estate Economics*, 23, 4:497-527.

Sierak, Jacek, Andrzej Galazka and Zbigniew Grzymala (1997), Investment Needs of Polish Gminas, Research Report commissioned by the World Bank's Municipal Finance Project, Warsaw

Weclawowicz, Grzegorz (1996), *Contemporary Poland. Space and Society*, UCL Press, London.

Statistical Publications from the Central Statistical Office, Warsaw

Rocznik Statystyczny, Statistical Yearbook, various years.

Maly Rocznik Statystyczny, Small Statistical Yearbook, various years.

Rocznik Statystyczny Wojewodztw, Statistical Yearbook for Voivodships 1999.

Rocznik Demograficzny, Demographic Yearbook, various years.

Rocznik Statystyczny Przemyslu, Industry Yearbook, various years.

Rocznik Statystyczny Pracy, Employment Yearbook, various years.

Polska W Nowym Podziale Terytorialnym, Poland in the New Administrative Territories, 1998.

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