

## **CHARACTERISTICS OF THE URBAN SETTLEMENT NETWORK IN WARMIA AND MAZURY**

***Marcin Bogdański***

Department of Macroeconomics  
University of Warmia and Mazury

**Key words:** urbanisation processes, urban centres network, urban population growth rate, urban development rate.

### **Abstract**

This study is based on the assumption that a developed network of large and medium-sized urban centres is an important factor which determines the economic potential of a region, with urban development – through a system of feedbacks with the surrounding area – driving the growth of the whole region. Based on this notion, an analysis of the urban dynamic processes was conducted and the urban centres network in the province of Warmia and Mazury was characterised. The aim of the analysis was to answer the question of whether the relatively lower level of socio-economic development of Warmia and Mazury, which has been observed for the past several decades, can be attributed to inadequate development of the urban settlement network and is disadvantageous – from the developmental point of view – for town size structure.

The research conducted for the study supports the proposed hypothesis. The network of large and medium-sized urban centres in Warmia and Mazury is poorly developed, with a considerable disparity between it and, not only better urbanised areas, but also the national average. When the data is juxtaposed with the regional differentiation of the economic development in Poland, a significant positive correlation between those two factors appears.

### **CHARAKTERYSTYKA MIEJSKIEJ SIECI OSADNICZEJ WARMII I MAZUR**

***Marcin Bogdański***

Wydział Nauk Ekonomicznych  
Uniwersytet Warmińsko-Mazurski

**Słowa kluczowe:** rozwój regionalny, procesy urbanizacyjne, sieć ośrodków miejskich, dynamika rozwoju miast.

### **Abstrakt**

Przyjęto założenie, że istotnym czynnikiem determinującym potencjał gospodarczy regionu jest rozwinięta sieć dużych i średnich ośrodków miejskich. Rozwój miast przez system sprzężeń zwrot-

nych z otoczeniem pełni funkcję „lokomotywy wzrostu” całego regionu. Przeanalizowano dynamikę procesów urbanizacyjnych oraz przedstawiono charakterystykę sieci ośrodków miejskich w regionie warmińsko-mazurskim. Celem analizy jest odpowiedź na pytanie, czy relatywnie niższy poziom rozwoju gospodarczo-społecznego Warmii i Mazur obserwowany przez ostatnie kilkadziesiąt lat może być wytłumaczony niedostatecznym rozwojem miejskiej sieci osadniczej oraz niekorzystną z punktu widzenia możliwości kreowania rozwoju gospodarczego strukturą wielkości miast. Wyniki badań zdają się potwierdzić przyjętą hipotezę. Województwo warmińsko-mazurskie należy do najsłabiej zurbanizowanych regionów naszego kraju o względnie dużej dominacji miast małych i małej stopie wzrostu liczby ich mieszkańców.

## **Introduction**

Towns play an important role in creating and stimulating economic growth. Towns have always been places where factors positively affecting economic growth have accumulated – large resources of free capital, labour force, intellectual potential, technical innovations, unsatisfied market demand (GORZELAK, SMĘTKOWSKI 2005, p. 13). Hence, development of towns can effectively stimulate the economic condition of the surrounding region.

Similar conclusions can be drawn from the analyses conducted by the European Commission, whose report on cohesion policy and the role of towns in ensuring its effective implementation states that development of a region is interdependent with the development of the towns situated in it<sup>1</sup>. Treating towns as potential sources of growth is coherent with the top-down development theory – one of the major theories of growth poles by F. Perroux (BENKO 1993, p. 42).

According to this idea, economic development is not evenly distributed in an area, but concentrates in several points of higher growth rate. Such points, called growth poles, are usually large and medium sized towns or industrial centres, hence, growth differentiation can be geographic or sectoral (PIOTROWSKI 2004, p. 23-24). On the other hand, however, one cannot ignore the fact that the level of a town's economic development is related to the economic condition of the region. There is a distinct feedback – the higher the development level of a region, the higher the growth rate of the towns situated in it.

These assumptions provide the starting point for the analysis of the demographic processes dynamics in the towns of Warmia and Mazury during the past thirty years, and an assessment of the urban settlement network development in the area. Comparison of the data with other regions of the country will provide an answer to the question of whether the relatively low level of socio-economic development of the Warmia and Mazury region can be attributed to the low development rate of towns.

---

<sup>1</sup> “Cohesion policy and cities: the urban contribution to growth and jobs in the regions”, Commission staff working paper, Commission of The European Communities, Brussels 2005, p. 2.

## **Objectives, subject, scope and methods of research**

The region of Warmia and Mazury is one of the most poorly developed areas in Poland. One of the reasons might be the inadequate development of the network of large and medium-sized urban centres, which could play the role of regional and local growth poles. This study presents fluctuations of the population sizes of selected towns in Warmia and Mazury in relation to the data for the whole country and identifies those centres which during the period under study met the criteria of regional growth poles and which could stimulate the regional development in future.

According to the concept of growth poles, the centres which could play the role include only those towns in which the population growth rate during the period under study was higher than the regional average (SOBALA-GWOSDZ 2007).

Two hypotheses have been adopted in the study. According to the first one, during the period under study there was a positive correlation between the size of a given urban centre (measured by the size of its population) and its population growth rate. Therefore, the bigger the urban centre, the higher its population growth rate. According to the other hypothesis, the more large towns with a high population growth rate there are in the region, the more favourable are the conditions of development and the more competitive the region is. Therefore, the foundations of permanent development of a region include good structure and size of an urban settlement network.

Leaving aside the level of socio-economic development, an increase in a town's population is, in this study, considered equivalent with its development; hence, the term "development" or "regression" of a town is used to describe the demographic processes that take place in it.

In order to verify the proposed hypotheses, the set of towns of the former Province of Olsztyn (within its boundaries of 1975) was enlarged by several urban centres from the neighbouring regions and divided into four groups, depending on their size.

Group A included those towns which after the reform of 1975 retained or gained the status of a provincial capital. As there are only two such towns in the present-day Province of Warmia and Mazury – Olsztyn and Elbląg – in order to make the group bigger, similar towns from the neighbouring regions – Ciechanów, Ostrołęka, Ełk and Suwałki – were taken for analysis. Although Ełk has never been a province capital, it was included in group A due to the size of its population, which is bigger than in Suwałki, Ostrołęka and Ciechanów. On 31 December 1973, the average population of the analysed towns was about 52 thousand people, with the biggest of them – Olsztyn – inhabited by 105.6 thousand people and the smallest – Ostrołęka – by 25.1 thousand.

Group B included 6 towns with the population (31 December 1973) ranging from 17.1 thousand (Bartoszyce) to 22.6 thousand (Ostróda), with the average population of 19.4 thousand. Another group – C – included 10 towns with populations ranging from 13.6 thousand to 9.2 thousand and the average of 11.5 thousand. The last group comprised 14 smallest towns, with an average population of 5.2 thousand people as of the end of 1973. The largest of them – Pasłek – had a population of nearly 7.9 thousand, and the smallest – Bisztynek – merely 2.2 thousand. Altogether, 36 towns were included in the analysis.

A comparative method was used in the assessment of town size, with the average size calculated as the arithmetical average of the populations within the groups in consecutive years. This gave the town development rate in particular groups. The results were compared in consecutive three-year periods. The results obtained were used to calculate the average growth rate (in three-year periods) of the average population in each of the groups. The structure of the town sizes and the provincial area per town were, in turn, used as the basis for an analysis of the urban centres network in the Warmia and Mazury region.

The time period of the analysis covered the years 1973-2005. The period was divided into two sub-periods – from 1973 to 1990 and from 1990 to 2005. The year 1990 can be regarded as a turning point. That was the year when, after over a decade of dynamic growth, there was a significant slow-down in the population growth, both in Warmia and Mazury, and all over the country. Hence, in order to show the discussed processes better, 1990 was taken as the transition point.

### **The size of an urban centre and its development rate**

Of the total number of 36 urban centres, most are small and medium-sized towns. Together, they account for over 85% of the analysed units. A group of larger towns comprises only 6 towns from group A. However, those are towns that even in Poland are difficult to be regarded as large, as only cities with over 200 thousand inhabitants can be included in this group.

Table 1 shows the average population size in towns in Warmia and Mazury in the period between 1973 and 1990. The highest growth rate was recorded for the towns in Group A. During the analysed 17 years, their average population increased by nearly 60%. Considering the dynamics of the change during the relatively short period, the development rate must be regarded as high. The corresponding values for Group B – the towns with the average population of nearly 20 thousand – were only slightly lower. Relatively small towns – groups B and C – developed quickly, but much more slowly than the largest ones.

Table 1

The population and change rate in the towns of the Warmia and Mazury region in the years 1973-1990 (31 December)

| Group   | Number of towns | 1973                          | 1990                          |                        |   |
|---------|-----------------|-------------------------------|-------------------------------|------------------------|---|
|         |                 | Average population, thousands | Average population, thousands | Growth rate (1973=100) | Average growth rate in three year periods (%) |
| Group A | 6               | 51.8                          | 82.9                          | 159.3                  | 8.1   |
| Group B | 6               | 19.4                          | 29.6                          | 154.7                  | 7.6   |
| Group C | 10              | 11.5                          | 16.6                          | 144.5                  | 6.3   |
| Group D | 14              | 5.2                           | 6.9                           | 132.9                  | 4.8   |
| Total   | 36              | 22.0                          | 34.0                          | 147.4                  | 6.7   |

Source: *Statistical yearbooks for the Provinces of Olsztyn, Ciechanów, Elbląg*, WUS, 1974, 1976, 1979, 1982, 1985, 1988, 1991. Presentation of data and calculations by the author.

The data presented in Table 1 indicate clearly that the growth of the population of towns in Warmia and Mazury in the period 1973-1990 was accompanied by faster development. The rate of changes and the average (for three years) growth rate indicate a distinct relationship between a town size and its capacity for development. This proves the existence of a positive relationship between the size of a town and its development growth. Therefore, initial analyses corroborate the assumptions formulated in the hypothesis.

The most characteristic feature in the period covering the years 1990-2005 was a considerable drop in the growth rate for the analysed towns, even with regression observed in some groups. A positive relationship between the size of a town and its development rate can still be observed, but it is not as distinct as before 1990. The growth of the largest towns was still the fastest, with their population increasing by nearly 6%. In the other towns, the growth rate ranged from -1.6% for Group B to 0.7% for Group C.

The average population growth rate in the largest towns dropped in relation to the previous period and was equal to only 1.2% for three-year periods. Compared to the years 1975-1990, this is a considerable decrease in the growth rate and if the tendency persists, it can negatively affect the capacity for development, both of the towns and of the regions as a whole. For the other towns, the value decreased even more and ranged from -0.3% and 0.8%.

Usually, a 100% growth of a town's population during a so-called "economic planning perspective", i.e. during the period of 20 years (PONIATOWICZ 1998, p. 46) is regarded as determinant of dynamic growth.

Table 2  
The number of inhabitants and rate of changes in the towns of the Province of Warmia and Mazury in the period 1990-2005 (as of 31 XII)

| Group   | 1990                           | 2005                           |                              |                                   |                              |                                   |
|---------|--------------------------------|--------------------------------|------------------------------|-----------------------------------|------------------------------|-----------------------------------|
|         | Average population (thousands) | Average population (thousands) | Growth rate (years 1999=100) | Average growth rate 1990-2005 (%) | Growth rate (years 1973=100) | Average growth rate 1973-2005 (%) |
| Group A | 82.9                           | 87.8                           | 105.9                        | 1.2                               | 169.3                        | 5.0                               |
| Group B | 29.6                           | 29.1                           | 98.4                         | -0.3                              | 149.8                        | 3.9                               |
| Group C | 16.6                           | 16.7                           | 100.7                        | 0.8                               | 145.5                        | 3.8                               |
| Group D | 6.9                            | 6.9                            | 100.5                        | 0.1                               | 133.6                        | 2.7                               |
| Total   | 34.0                           | 35.2                           | 101.4                        | 0.5                               | 149.6                        | 3.9                               |

Source: Statistical yearbooks for the Provinces of Olsztyn, Ciechanów, Elbląg, WUS, 1991, 1994, 1997. Presentation of data and calculations by the author.

\* data for the years 1999-2005: GUS, [http://www.stat.gov.pl/cgi-bin/demografia/xrap?woj=28&table=web-lsa&\\*rok=2005&gmina=3090&mw=2](http://www.stat.gov.pl/cgi-bin/demografia/xrap?woj=28&table=web-lsa&*rok=2005&gmina=3090&mw=2), 30.01.2007, 22.00 hrs.

Taking even a 30-year period of analysis, the population growth rate for the towns of Warmia and Mazury was lower. The average value for the whole set of towns for the period between 1973 and 2005 was merely 49.6%, with the value for the biggest towns close to only 70%. Consequently, assuming further that the regional development level depends on the development of towns in the region, this can provide an explanation of the poorer socio-economic development of this part of Poland.

One of the characteristic features of the population changes in Warmia and Mazury in the period 1990-2005 was a considerable decrease in the growth rate. This reflects a more general phenomenon which can be observed around the country, where negative tendencies in demographic processes have been observed since the early 1990s. The average population size in 1973-1990 in all the towns in Warmia in Mazury increased by 6.7% in three-year periods, whereas after 1990 the index dropped to the level of 0.5%. However, it should be noted that its value is significantly affected by a relatively high growth rate in the largest towns, which during the period reached 1.2%. In 1990-2005, the small and medium-sized towns recorded a very low (and even negative in group B) average population growth rate.

The stagnation observed in small and medium-sized centres and the high growth rate observed in large towns at the time makes the latter the potential regional growth poles. During the period under study only they recorded steady and stable growth which was higher than the average for the region, which according to the adopted assumptions is a necessary condition to stimulate the development of the local and regional surroundings.

## Characteristics of the network of urban centres

As economic practice has shown, particularly favourable conditions for creating processes of regional development exist in highly urbanised areas, with large and well developed network of big urban centres, and in areas directly influenced by large cities. In such a settlement network, the stimuli for development can propagate faster and more effectively, affecting the economic growth of the region (HARAŃCZYK 1998, p. 67).

In 2004, there were 49 municipalities in Warmia and Mazury (in this case, the set under study includes the towns situated in the present-day province of Warmia and Mazury). Taking into account the overall number of towns in Poland, they account for 5.5% of the number. At the end of 2004 they were inhabited by 858.8 thousand people, with the inhabitants of the two largest towns of the region – Olsztyn and Elbląg – accounting for nearly 1/3 of the urban dwellers in the region. Altogether, the inhabitants of all the towns in the region account for 60.1% of the provincial population, which is close to the national average, where the proportion of urban inhabitants is equal to 61.5%. For particular provinces, a higher urbanisation index is observed in the provinces of Silesia (78.8%), Lower Silesia (71%), West Pomerania (69.3%), Pomerania (67.5%), Mazovia (64.7%), Łódź (64.7%), Lubuskie (64.2%) and Kujawy-Pomerania (61.7%).

Table 3  
The size of urban centres in the province of Warmia and Mazury in 2004 (as of 31.12)

| Province              | Population   |                |                 |              |
|-----------------------|--------------|----------------|-----------------|--------------|
|                       | Below 50,000 | 50,000-100,000 | 100,000-200,000 | Over 200,000 |
| Warmia and Mazury     | 46           | 1              | 2               | 0            |
| Warmia and Mazury (%) | 93.9         | 2.0            | 4.1             | 0.0          |
| Poland                | 798          | 49             | 21              | 18           |
| Poland (w %)          | 90.9         | 5.5            | 2.4             | 2.1          |

Source: *Miasta w liczbach 2003-2004*, GUS, <http://www.stat.gov.pl/opracowania-zbiorcze/index.htm>, 10.01.2007, 12.00 hrs. Presentation of data and calculations by the author.

Considering the structure of the urban centres situated in the province of Warmia and Mazury, it is also close to that typical of the whole country. Small cities, below 50 thousand inhabitants, are a majority; in Warmia and Mazury they account for 90% of the total number. However, the absence of urban centres over 200 thousand is disadvantageous for the region; its potential for development. And those are the urban centres which are more than other able to accumulate and generate economic impulses which can stimulate the

regional economy. A study conducted by American researchers has shown that for an urban centre to effectively influence the surrounding region and stimulate its growth, it has to be inhabited by at least 250 thousand people (HANSEN 2001, p. 25). Similar conclusions can be drawn from the findings of a study by A. Potrykowska. She claims that in Poland only cities of at least 200 thousand are able to provide sufficient stimuli to drive a region's development (KOŁODZIEJSKI, STASIAK 1986, p. 61). The region under study has only two cities (Olsztyn and Elbląg) with a population ranging from 100 to 200 thousand and one (Ełk) inhabited by close to 55 thousand people.

When the average size of an urban centre in the Province is considered, which at the end of 2004 in the province under study was equal to 17.5 thousand inhabitants, only two other provinces in the country – Lubuskie and Opolskie – had towns with a lower average population size. These were, respectively, 15.4 thousand and 15.8 thousand.

The domination of small towns in the urban centre network does not result in the domination of the population of such towns in the population of the province. In this case, the population of the largest towns, with populations over 50 thousand, dominates. In the area under study there are only three such towns, yet their population accounts for more than 40% of the urban dwellers in the region.

Table 4

Urban population by city size (as of 31.12.2004)

| Province          | Population in city, by the city size |                |                 |              |
|-------------------|--------------------------------------|----------------|-----------------|--------------|
|                   | Below 50,000                         | 50,000-100,000 | 100,000-200,000 | Over 200,000 |
| Warmia and Mazury | 58.4                                 | 6.5            | 35.1            | –            |
| Poland            | 38.7                                 | 14.2           | 12.2            | 34.9         |

Source: *Miasta w liczbach 2003-2004*, GUS, <http://www.stat.gov.pl/opracowania-zbiorcze/index.htm>, 10.01.2007, 12.00 hrs. Presentation of data and calculations by the author.

Therefore, on the one hand there are three relatively large urban centres inhabited by the largest portion of the population of all the towns in the province, on the other – there are 46 smaller entities (of which those under 10 thousand inhabitants account for over half of the total number of towns), which are inhabited by the remaining population of Warmia and Mazury. This indicates not only a considerable distribution of the municipal population between big and small towns, but primarily their underdevelopment as compared to the bigger towns.

Compared to the data for the whole country, the structure of the population of the biggest towns in the Province is also disadvantageous. The majority share of the national average are the populations of big towns, exceeding



200 thousand, i.e. the centres which can effectively influence the surrounding region. The largest portion of the population of the province of Warmia and Mazury are inhabitants of towns with the medium-sized (as compared to the rest of the country) population; this is also too small (according to the results of the previously mentioned studies) to effectively influence the economy of the region.

Another factor which reveals the level of development of an urban network is the urban centre density index, calculated as the ratio of the region's area and the number of towns situated there. The values of the index are presented in Table 5. For the sake of comparison, such data are also presented for the provinces where the urban network development level is the highest and for the whole country.

Compared to the whole country, the province of Warmia and Mazury has one of the most poorly developed urban settlement networks, with one town per nearly 500 square kilometres of the area. It is one of the highest values in Poland which, together with a relatively small size of an average town in the region, shows the gap between Warmia and Mazury and not only the most highly urbanised provinces, but also the national average.

Table 5

Urban density index in 2004

| Province          | Number of towns | Province area (km <sup>2</sup> ) per 1 town |
|-------------------|-----------------|---|
| Warmia and Mazury | 49              | 494   |
| Lubelskie         | 41              | 613   |
| Silesia           | 71              | 178   |
| Poland (total)    | 886             | 352.9                                       |

Source: *Miasta w liczbach 2003-2004*, GUS, <http://www.stat.gov.pl/opracowania-zbiorcze/index.htm>, 10.01.2007, 12.00 hrs. Presentation of data and the calculations by the author.

Significantly, the most poorly urbanised areas also include the Provinces of Podlasie and Lublin, that is those situated in the eastern, most poorly developed macroregion of Poland with the lowest level of socio-economic development. On the other hand, the regions with the most highly developed urban network, i.e. the provinces of Lower Silesia and Małopolska are those with the highest level of economic development (*Miasta w liczbach 2003-2004*). The disproportions manifest themselves in considerable differences between the per capita GDP, the size and structure of the added value or the level of the economic and social activity of the population (GORZELAK 2004, p. 37-59). A comparison of the values clearly shows the significant differences between

the levels of economic development of the regions depending on the development of the urban network, which is what the second hypothesis claims. (GORZELAK 2004, p. 37-59)

## **Conclusions**

The analysis of the network of urban centres in the Province of Warmia and Mazury and their development rate has produced the following conclusions:

1. The years 1973-1990 were periods of dynamic development of the towns of Warmia and Mazury. During the period, their population increased by nearly 47% on average, with the mean growth rate (for three-year periods) calculated as 6.7%. In the process, a significant positive relationship between the size of towns under study and their development rate was found. The growth rate for large towns, comprising Group A, was nearly twice as high (8.2%) as the smaller ones (4.9%). The values for the towns from groups B and C were 7.3% and 6.3%, respectively. The data positively verify the first hypothesis.

2. The other of the analysed periods, the years 1990-2005, saw a distinct and progressive decrease in the tempo of positive demographic processes in the towns of the region. The trend was particularly visible in small towns, whose population at the end of 1973 did not exceed 20 thousand. The year 1990 was a breaking point which marked the beginning of a period of stagnation and, in some cases, even of regression in terms of the population sizes in towns. A lower population growth rate was also typical of larger towns, although it was higher than in other towns. The conclusion that can be drawn is that only those urban centres could influence their surroundings, playing the role of regional growth poles. There are three such towns in Warmia and Mazury – Olsztyn, Elbląg and Elk – and it is them (small as they are in comparison with other towns in Poland) that should be regarded as potential centres stimulating the development of the region.

3. A comparison of the condition and structure of the urban network in Warmia and Mazury with the area of Poland reveals considerable differentiation. A typical feature of the province of Warmia and Mazury is the domination of small urban centres with the population not exceeding 10 thousand inhabitants. The structure of urban population is dominated by inhabitants of the biggest towns, which are, in turn, the least numerous. Additionally, the density of urban centres is by nearly 40% lower than the national average, which means that a relatively small part of the province is situated within the sphere of influence of towns.

4. Taking the assumption of the dominating role of towns in creating regional development, which is claimed by F. Perroux's theory of growth poles, a lower level of socio-economic development of Warmia and Mazury can be attributed to an insufficiently developed network of urban centres. The most rapidly developing provinces in Poland include the provinces of Wielkopolska and Lower Silesia, whereas the most economically backward regions include the provinces of Warmia and Mazury, Podlasie, Lublin and Podkarpackie. The urban centres networks in the former, unlike those in the latter, are well developed, with a relatively high proportion of big towns. Therefore it can be concluded that the disparities in the development of various areas of Poland can be largely attributed to the size of towns and their distribution. This fact positively verifies the second hypothesis.

5. Two factors can be observed in Warmia and Mazury which make the situation of the region much less advantageous than other provinces. Both the structure of town sizes and their distribution are permanent features and it is difficult to even think of a change. Therefore, if two factors have a permanent negative effect (compared with other provinces) on the region's development, it is almost certain that the existing disparities will persist for a long time.

Translated by JOANNA JENSEN

Accepted for print 5.02.2008

## Reference

- BENKO G. 1993. *Geografia technopolii*. Wydawnictwo Naukowe PWN, Warszawa.
- GORZELAK G. 2004. *Polska polityka regionalna wobec zróżnicowań polskiej przestrzeni*. *Studia regionalne i lokalne*: 4(18).
- GORZELAK G., SMĘTKOWSKI M. 2005. *Metropolia i jej region w gospodarce informacyjnej*. Wydawnictwo Naukowe SCHOLAR, Warszawa.
- HANSEN N.M. 2001. *How regional policy can benefit from economic theory*. *Growth and change*, 1(1).
- HARAŃCZYK A. 1998. *Miasta polskie w procesie globalizacji gospodarki*. Wydawnictwo Naukowe PWN, Warszawa.
- KOŁODZIEJSKI J., STASIAK A. 1986. *Koncepcja podziału dwustopniowego- wariant podstawowy*. W: *Podział administracyjny kraju*. *Studia, materiały, dyskusje*, Biuletyn, Zeszyt 128, PAN Komitet Przestrzennego Zagospodarowania Kraju, Państwowe Wydawnictwo Naukowe, Warszawa.
- PIOTROWSKI D. 2004. *Rozwój peryferyjnego ośrodka o znaczeniu regionalnym a zmiany struktur funkcjonalno-przestrzennych na przykładzie Suwałk*. Wyższa Szkoła Rozwoju Lokalnego, Żyrardów.
- PONIATOWICZ M. 1998. *Procesy urbanizacyjne na obszarze Polski północno-wschodniej*. Wydawnictwo Uniwersytetu w Białymstoku, Białystok.
- Cohesion policy and cities: the urban contribution to growth and jobs in the regions*. 2005. Commissions Staff Working Paper, Commission of The European Communities, Bruksela.
- A. Sobala-Gwosdz, *Obszary wzrostu i stagnacji w województwie podkarpackim*. <http://www.geo.uj.edu.pl/zaklady/zrr/publikacje/books/pdf/ASG%20wstep.pdf>.
- Miasta w liczbach 2003-2004*, GUS, <http://www.stat.gov.pl/opracowania-zbiorcze/index.htm>.