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ARE POLISH RURAL AREAS DESTINATIONS FOR COMMUTING?

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Abstract. Rural areas in Poland have faced significant changes recently. The primary sector has been decreasing its contribution to local employment. The aim of the paper is to identify to what extent rural areas in Poland are destinations for incoming commuters. The degree of urbanisation (DEGURBA) framework was used as a reference for an urban-rural typology of local units. The National Census of Population and Housing 2011 provided the most recent data on commuting in municipalities of Poland.

A statistical analysis with use of the V Cramer coefficient proves a strong relationship between a type of local unit and a number of incoming commuters and a medium relationship between a type of local unit and density of incoming commuters. Generally, urban local units tend to attract the highest number of commuters. Rural areas attract relatively less commuters – the number of rural local units decreases as one considers a higher number of commuters. However, there exist some exceptions of intermediate and rural local units where a significant number of commuters work because of their localization close to big cities or some specific activities located there.

Key words: rural areas, commuting, DEGURBA.

JEL code: J61, R23

Introduction

Polish rural inhabitants have been facing many challenges connected with the economy's transformation, including a decrease of the primary sector's role and the development of other, non-agricultural functions of rural areas. These processes contribute to changes in the labour market (Drejerska N., 2010). There are clear differences in the employment rate between thinly-populated and densely-populated areas in Poland (Drejerska N., 2014). The demographic and financial situation of rural population is largely determined by the distance between place of residence and a large urban centre. Rural areas located near large cities can be characterized by higher population density, high positive net migration and lower share of the unemployed in comparison to remote rural areas (Central Statistical Office of Poland, Statistical Office in Olsztyn, 2013).

The aim of the paper is to identify to what extent rural areas in Poland are destinations for incoming commuters. The following specific research tasks have been set: 1) to investigate a relationship between a local unit's type (urban-rural) and a number and density of incoming commuters; 2) to visualise data on commuting to rural areas on maps and to interpret spatial patterns. In such an approach, rural areas are treated as a starting point of the research process and an ability to attract incoming commuters means a sign of development potential. This relation results from perception of labour market as an element of socio-economic development of rural municipalities (Wojewodzka-Wiewiorska A., 2014). This topic is also especially important as urban and regional development studies have tended to focus on urban centres (Gorecka A., 2015) as the driving forces in innovation and growth, with surrounding rural areas cast in a passive and residual role (Ward N., Brown D. L., 2009). Historically, cities were treated as places playing a role of socio-economic centre offering employment (Rakowska J., 2014).

The first step, before the main analysis, is to clearly define what types of territories are considered as rural. There are many various classifications used for different purposes. For this study, the author applied the degree of urbanisation (DEGURBA). DEGURBA methodology distinguishes the following types of territories (Eurostat, 2015):

- **high-density clusters (or city centre):** contiguous grid cells of 1 km^2 with a density of at least 1 500 inhabitants per km^2 and a minimum population of 50 000;

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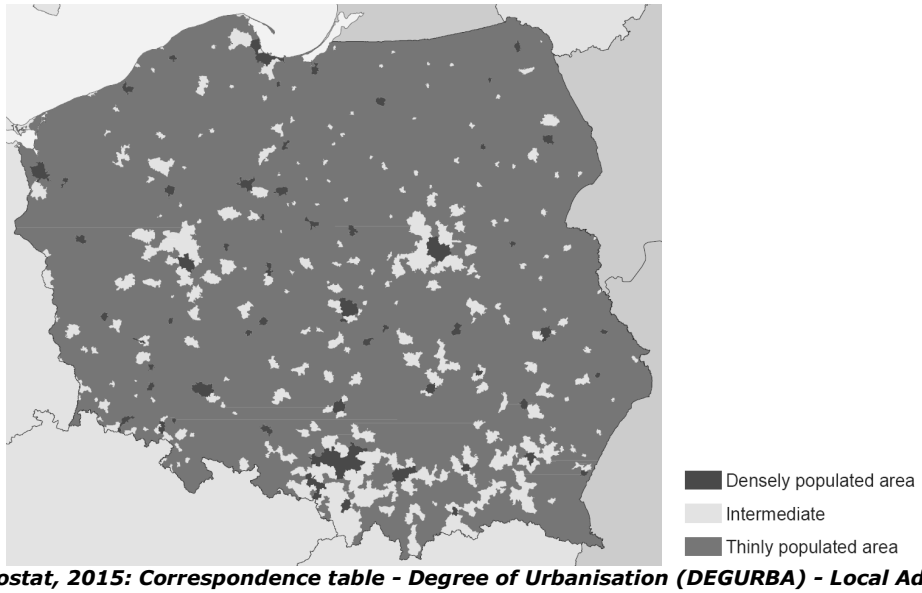
- **urban clusters:** clusters of contiguous grid cells of 1 km^2 with a density of at least 300 inhabitants per km2 and a minimum population of 5 000;
- **rural grid cells:** grid cells outside urban clusters.



Source: Eurostat, 2015: Correspondence table - Degree of Urbanisation (DEGURBA) - Local Administrative Units. Retrieved: http://ec.europa.eu/eurostat/ramon/miscellaneous/index.cfm?TargetUrl=DSP_DEGURBA. Access: 10.12.2015

Fig. 1. **Degree of urbanization (DEGURBA) in Poland in 2011**

The degree of urbanisation creates a three-way classification of LAU2s[1] as follows:

1) densely populated area (alternate name: cities or large urban areas): at least 50 % lives in high-density clusters;

2) intermediate density area (alternate name: towns and suburbs or small urban areas): less than 50 % of the population lives in rural grid cells and less than 50 % lives in a high-density cluster;

3) thinly populated area (alternate name: rural area): more than 50 % of the population lives in rural grid cells.

4) According to the Eurostat data, a structure of inhabitants aged 20-64 in particular types of DEGURBA areas in 2014 was as follows:

- 41 % in cities in the EU (36 % in Poland);
- 32 % in towns and suburbs in the EU (24 % in Poland);
- 27 % in rural areas in the EU (41 % in Poland).

It can be seen that a proportion of inhabitants in rural areas in Poland is significantly higher than on average in the EU. It can be a further reason for investigation of labour market on rural areas and its potential to absorb commuters.

The National Census of Population and Housing 2011 provided data on commuting for the year 2011. It results in using DEGURBA classification for the year 2011 (Eurostat, 2015) (Figure 1) as a reference.

Statistical analyses were carried out with use of the V. Cramer's coefficient to examine the relationship (correlation) between the type of local unit according to degree of urbanisation and:

- the scale of incoming commuting;
- density of commuters per 1 km^2 of build-up and urbanized areas.

[1] LAU 2 - Local Administrative Units 2, formerly NUTS level 5.

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Table 1

Descriptive statistics for the number of incoming commuters across local units

Number of local units			2908
Number of incoming commuters (persons)	**Average**		948
	Minimum		10
	Maximum		271392
	Percentiles	**20**	48
		40	115
		60	247
		80	666

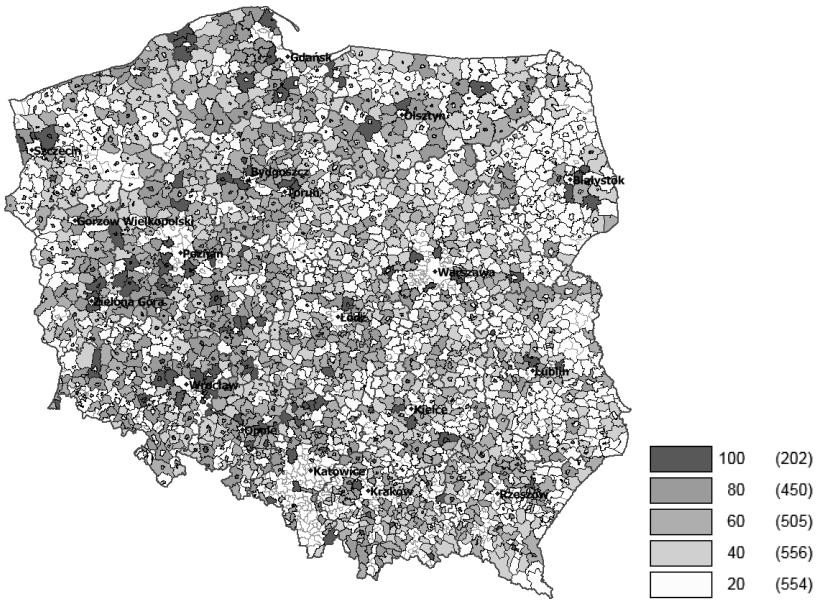
Source: author's calculations based on data of National Census of Population and Housing 2011, Central Statistical Office of Poland

Table 2

Degree of urbanisation (DEGURBA) vs. percentiles of incoming commuters

DEGURBA \ **Percentile**		**20**	**40**	**60**	**80**	**100**	**Total**
1 – urban area	**number of local units**	0	0	0	0	73	73
	% of DEGURBA	0	0	0	0	100	100
2 – intermediate area	**number of local units**	21	31	74	134	308	568
	% of DEGURBA	4	5	13	24	54	100
3 – rural area	**number of local units**	554	556	505	450	202	2267
	% of DEGURBA	24	25	22	20	9	100
Total	**number of local units**	575	587	579	584	583	2908
	% of total	20	20	20	20	20	100

Source: author's calculations based on data of National Census of Population and Housing 2011, Central Statistical Office of Poland



Source: author's calculations based on data in Table 2

Fig. 2. **A scale of commuting in rural areas according to percentiles of incoming commuters**

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The choice of the coefficient was conditioned by the kind of data – the V. Cramer's coefficient allows comparison of categorical variables and it is the most useful one when variables have more than two categories (Field A., 2009).

Research results and discussion

The National Census of Population and Housing 2011 provided data for 2908 local units[1] in Poland on a number of commuters working there (incoming commuters). Available results include units with flows more than 9 persons, so the minimal number of commuters is 10. The maximum is represented by the Polish capital, at the same the largest Polish city, Warsaw (Table 1).

Generally, it should be concluded that majority (60 %) of local units attract not more than 247 commuters. This scale of incoming commuting in particular unit can be treated as an equivalent of employment in a medium enterprise[2]. A group of the first ten units with the highest number of incoming commuters consists of Warsaw, Katowice, Krakow. Poznan, Wroclaw, Lodz, Rzeszow, Gdansk and Lublin (regional capitals) as well as Bielsko-Biala.

Data on commuting (Table 2) proves that urban areas attract commuters to a most significant extent. All local units with 20% of the highest number of incomings have urban character according to DEGURBA. There are some rural units attracting many incoming commuters; they are located near regional capitals, for example Wroclaw, Zielona Gora, Poznan, also Warsaw (Figure 3).

In order to verify if there is a statistically important relationship between a scale of commuting (expressed according to percentiles of number of incoming commuters) and a character of a local unit, the author calculated the V. Cramer coefficient. To calculate it, only intermediate and rural areas were taken into account as urban areas represented only a largest scale of commuting. For 2835 local units, the V. Cramer coefficient has the value of 0.503 with the level of significance $p<0.001$. The V. Cramer's coefficient lies in the interval <0; 1>, where 0 means no association and 1 perfect association. Some references suggest the following interpretation (Sheskin D. J., 2011):

- <0.1; 0.3) – small relationship;
- <0.3; 0.5) – moderate relationship;
- <0.5; 1> - strong relationship.

As a result it can be concluded that the calculated value of the V. Cramer's coefficient indicates a strong relationship between a character of a local unit and a scale of attracting commuters. Local units characterized as intermediate areas tend to attract more incoming commuters – more such units represent higher numbers of commuters. Rural areas attract relatively less commuters – the number of rural local units decreases as one considers a higher number of commuters.

As local units are diversified across Poland in terms of their area, so the next step of the analysis is to check if the scale of incoming commuters can be conditioned by a physical area of particular local unit. In other words, to check if simply larger local units attract a greater number of incoming commuters. In such a situation, a type (rural or urban) does not matter because the primary relation lies between the area of a local unit and the number of incoming commuters. In order to verify it, a density of incoming commuters was calculated as a number of commuters per 1 km^2 of build-up and urbanized areas of particular local unit (Table 3).

1 LAU 2 (Local Administrative Units 2, formerly NUTS level 5) as well as their urban and rural parts in case of those which have an administrative urban-rural character.
2 As according to the EU recommendation, a medium-sized enterprise has 50-250 staff headcount.

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Table 3

Descriptive statistics for the density of incoming commuters across local units

No of local units			2908
Density of incoming commuters (persons/km^2)	**Average**		120
	Minimum		1
	Maximum		2534
	Percentiles	**20**	13
		40	33
		60	75
		80	191

Source: author's calculations based on data of National Census of Population and Housing 2011, Central Statistical Office of Poland

Generally, it can be concluded that majority (60 %) of local units attract not more than 75 commuters per 1 km^2 of build-up and urbanized areas. It should be noticed that in the case of the density, there is not so straight relationship that the largest cities can be characterized by a higher density of commuters. In the ranking of the highest density, a group of first ten local units includes only two urban units (one of them is Warsaw), four intermediate and four rural local units. One reason which can lie behind this result is a specific character of the economy in some of these units. For example, there are two units, where coal mines are located. These types of large activities attract not only local inhabitants but also commuters from other local units. Moreover, providing analyses on such a low level of territorial division, it is necessary to stress that rural areas, even distinguished basing on the LAU 2 level, are not uniform. Intermediate rural areas, being more or less connected to cities, often show a positive development. At the same time, more peripheral rural regions are in a worse position because of some general characteristics that limit their potential to gain from smart growth policies, such as lack of scale in their population and industrial base and limited access to markets (Naldi L. et al., 2015).

Table 4

Degree of urbanisation (DEGURBA) vs. density of incoming commuters

DEGURBA \ **Percentile**		**20**	**40**	**60**	**80**	**100**	**Total**
1 – urban area	**number of local units**	0	0	0	18	55	**73**
	% of DEGURBA	0	0	0	25	75	**100**
2 – intermediate area	**number of local units**	17	28	90	177	256	**568**
	% of DEGURBA	3	5	16	31	45	**100**
3 – rural area	**number of local units**	543	563	503	385	273	**2267**
	% of DEGURBA	24	25	22	17	12	**100**
Total	**number of local units**	560	591	593	580	584	**2908**
	% of total	20	20	20	20	20	**100**

Source: author's calculations based on data of National Census of Population and Housing 2011, Central Statistical Office of Poland

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The relationship between the number of commuters and the type of a local unit confirmed before can be also true for density of incoming commuters (Table 4). Numbers of urban and intermediate local units are higher in a group of units representing higher density of incoming commuters. As far as spatial patterns of density of incoming commuters are concerned, neighbourhood to big cities is not so obvious (Figure 3).

Source: author's calculations based on data in Table 4

Fig. 3. **Density of incoming commuters in rural areas according to percentiles**

Rural local units with high density of incoming commuters represent towns (no big, classified as rural according to DEGURBA). They are parts of municipalities which have urban-rural character from administrative point of view in Poland. Consequently, they are marked on very small territories and cannot be clearly seen on the map of the whole country.

In order to verify if there is a statistically important relationship between density of incoming commuters and a character of a local unit, the author calculated again the V Cramer coefficient. For 2835 local units, it has the value of 0.423 with the level of significance $p<0.001$. It indicates the moderate relationship between the type of a local unit and density of commuters it attracts to.

Discussing detailed results of this research with results for other European countries can be difficult as many of economic studies refer to the urban-rural regional typology. This typology divides European regions (NUTS 3) into three types: predominantly rural, intermediate and predominantly urban. As a result, it is not possible to compare with division of local units (municipalities). It also means that much more economic data are accessible for this regional typology. However, the data collected for rural areas are linked to the data collected for rural regions as they are both defined by the share of population in rural grid cells (Dijkstra L., Poelman H., 2014).

Coming back to commuting to rural areas, it can be a part of the phenomena of reverse commuting, which was identified by many scientists, e.g. in Paris (Aguilera A., et al., 2009) or Madrid where researchers investigated new sub-centres in the suburban ring and commuting (Garcia-Palomares J. C., 2010). This of course applies to rural areas close to cities or towns and suburbs where a process of sprawl of economic activities outside of cities or even their suburbs takes place. Similar processes take place for logistic centres located close to a city but outside

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city's borders because of lower land prices and acceptable accessibility. This explanation has limited application in this case as usually there are intermediate density areas between cities and rural areas according to the DEGURBA classification. However, such a pattern can be identified (Figure 3); rural local units with highest numbers of incoming commuters are located near regional capitals, as for example Bydgoszcz, Wroclaw or Poznan.

The second clear reason for commuting to rural areas was displayed in the qualitative results of this research. There exist some local units, classified as rural ones, where some specific activities were located, as for example a military unit in Powidz. It is estimated that its liquidation can result in increase of unemployed by 70% in the municipality (Sirko S., 2012). However, also this situation should be treated as exception, which rather confirms conclusions drawn from cross-analysis between a number/density of commuters and the type of a local unit - rural areas generally do not attract commuters to such extent as cities and intermediate areas. A larger number of available work places in urban municipalities, so as a result a more significant potential to attract commuters, was for example noticed in Latvia (Bulderberga Z., 2015). A similar problem of lack of working places in rural areas was detected in the Czech Republic (Domeova L., Jindrova A., 2014).

Conclusions

Rural areas in Poland have recently faced significant changes. The primary sector has been decreasing its contribution to local employment. In such a situation, it is interesting to examine if rural areas have potential to attract commuters as workplaces' creation can be treated as an important development factor of particular territory. Data on commuting to local territorial units and types of local unites were cross-analysed in order to investigate it. The statistical analysis as well as visualization on maps proved that local units characterized as urban areas tend to attract the highest number of commuters. Rural areas attract relatively less commuters – the number of rural local units decreases as one considers a higher number of commuters. The same direction of the interpretation of the relationship occurred in the analyses of the absolute values of incoming commuters as well as in the case of their density per 1 km^2. However, it does not mean that rural or intermediate areas in Poland are not interested for commuters at all. There are some units, which thanks to their localization, relatively close to a city, or some special activities running there, attract a significant number of commuters.

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