

REGIONALIZATION OF THE OLOMOUC REGION: MODEL EXAMPLES AND APPLICATIONS

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Regionalization of the Olomouc Region: Model Examples and Applications.

The purpose of this paper is to show the spatial linkages between geographic areas or regions and their centers of different hierarchical levels, which were defined by application of several selected methods. Centre-hinterland and inter-region interactions are important for understanding the organization of geographical space. The definition of areas itself was developed on the basis of a detailed analysis of daily labour and school commuting. The resulting nodal regions were confronted with the areas defined according to the Reilly's Law, namely its topographic version and with the current administrative division of the region. In our paper we discussed the issue of exponent in the Reilly's Law formula for its application in the analysed region. The development of the administrative structure of the region is also a part of the article. The whole study is processed to the level of municipalities in the area of interest in the Olomouc Region.

Key words: Regionalization, nodal region, labour and school commuting, Reilly's Law, Olomouc region

INTRODUCTION AND THE AIMS OF THE STUDY

The issue of definition of commuting centers and their hinterlands is a frequent topic in the Czech professional literature and is dealt with on a number of geographic institutes (e.g. HAMPL 2004, MARYÁŠ 1983, TOUŠEK 2004, HALÁS 2009, etc.). Facing thus identified nodal regions on the basis of real links with theoretical areas is not so common. We meet more of comparing the administrative structure and the regions delimited on the basis of theories (most often the Reilly's Law), eventually with suggestion of application of these models for use in the administration (e.g. HUBÁČKOVÁ, KREJČÍ 2007, ŘEHÁK, KLAPKA, HALÁS 2009), in Western literature (e.g. BERRY 1967, FOTHERINGHAM, O'KELLY 1989, etc.). The aim of this paper is to extend the range of these works and to compare three different types of spatial organization of the Olomoucký region. We realized the first organisation of geographic area on the basis of real daily links (commute), which separated the studied territory into nodal regions. They are then confronted with the modelled regionalization of the region, which was made by application of Reilly's Law, namely its topographic version and application of the fifth root in its basic formula. In the final step we identified how the two models differ from the current administrative division of the region (to the level of areas of municipalities with commissioned local authority). Part of this work is, not least, the development of the administrative structure of the region since 1848, needed not only for understanding the links in the territory, but also serving as a base for illustration of the evolution, expiration and the emergence of regional centers in the region.

WORKING METHODS

For the definition of nodal regions in the Olomoucký region we used the data of labour and school commuting (CENSUS 2001). As a commuting center we specified such a place, at which at least 4 major commuting streams are directed. The smallest possible nodal region can thus contain 5 municipalities. No other criteria or limitation (e.g. population of nodal region, or the number of commuters to the center) were not taken in mind. Hereat we considered not only labour commuting, but we also performed the regionalization according to the daily migration to schools and finally to the total (labour + school) commuting. The initial hypothesis was that these daily systems can vary, which eventually (albeit not in an extensive scale) was confirmed.

While realizing this project we encountered subproblems that we solved by use of selected regionalization principles. If it happened that the examined municipality was isolated from the region where it belongs, we absorbed it into the region where it is found. In case that a municipality is located close to a border of two commuting catchment regions and its main commuting stream flows to a municipality which is not the center, we assigned it to the second most important region due to flow, etc.

In the next step, we came up to the realisation of regionalization by application of Reilly's Law. As modelled regional centers we chose the seats of commissioned local authorities.

The best known form of Reilly's Law is known in the form:

$$\sqrt{\frac{M_A}{M_B}} = \frac{d_{AB} - n}{n}$$

where:

M_A and M_B ... are the sizes of compared centers (usually $M_A \geq M_B$, in our case, we used the population)

d_{AB} ... is the distance between these centers (we considered the topographic version of the model, ie. this distance was considered to be a road distance between the two centers)

n ... is the distance from "larger" center to the equilibrium point

From the relationship we express n :

$$n = \frac{d_{AB}}{\sqrt{\frac{M_A}{M_B} + 1}}$$

Thanks to this relationship we are able to identify all points of the balance among selected centers and assign to them explicitly all municipalities of the region. When applying this formula we encountered a problem of the root coefficient in it. For Reilly's Law, or the law of retail gravitation, which was originally designed for analysis of business commuting, the typical root is a square root. However, many authors (SCHWARTZ 1963, MARYÁŠ 1983, KLAPKA, HALÁS 2009) suppose an application of roots of higher order, in particular when dealing with centers of lower hierarchical levels. We were forced to accede to this in our case, because the influence of some centers is not expressed in calculation with the square root. A higher root order strengthens the role of centers of lower level, and for the territory of the Olomoucký region, root of 5 appears to be the most effective.

HISTORICAL POLITICAL AND JUDICIAL DISTRICTS AS THE DRAFT FOR CURRENT ADMINISTRATIVE DISTRICTS

As already noted, the territory of the current Olomoucký region is divided into 13 administrative districts of municipalities with commissioned local authorities (SO ORP), which are further divided into 20 districts of municipalities with authorized municipal office (SO POÚ) - see Tab. 1 and Fig. 1. The following section deals with and compares political and judicial districts with current administrative districts and monitors major changes in the administrative structure of the Olomoucký region. As model we use political and judicial districts in 1850 (Tab. 2), which were modified during period 1850 – 1938 and re-established after the war and reached their peak form in January 1949. As it turned out, in most of the region the existing borders of administrative districts replicate the historic borders, eventually there were only a "cosmetic" adjustments. The most problematic part of the region seems to be the border of the Prostějov and Přerov regions.

THE OLOMOUCKÝ REGION		
district	SO ORP	SO POÚ
Jeseník	Jeseník	Javorník, Jeseník, Zlaté Hory
Olomouc	Litovel, Olomouc, Šternberk, Uničov	Hlubočky, Litovel, Moravský Beroun, Olomouc, Šternberk, Uničov + vojenský újezd Libavá
Prostějov	Konice, Prostějov	Konice, Němčice nad Hanou, Prostějov
Přerov	Hranice, Lipník nad Bečvou, Přerov	Hranice, Kojetín, Lipník nad Bečvou, Přerov
Šumperk	Mohelnice, Šumperk, Zábřeh	Hanušovice, Mohelnice, Šumperk, Zábřeh

Tab. 1 Administrative areas of municipalities with extended authority and with commissioned local authority in the Olomoucký region in 2009

Source: Czech Statistical Office: Administrative division of the Olomoucký region

THE REGION IN 1850 - 1855	
Political districts	Judicial districts
Holešov	Bystrice pod Hostýnem, Holešov, Napajedla
Hranice	Hranice, Lipník nad Bečvou, Město Libavá
Kroměříž	Kojetín, Kroměříž, Přerov, Zdounky
Litovel	Konice, Litovel, Uničov
Místek	Frenštát pod Radhoštěm, Místek, Moravská Ostrava
Nový Jičín	Fulnek, Nový Jičín, Příbor
Olomouc	Olomouc, Prostějov, Plumlov
Šternberk	Dvorce, Rýmařov, Šternberk
Šumperk	Staré Město, Šumperk, Vízemberk
Uherský Brod	Uherský Brod, Valašské Klobouky, Vizovice
Uherské Hradiště	Strážnice, Uherské Hradiště, Uherský Ostroh
Valašské Meziříčí	Rožnov pod Radhoštěm, Valašské Meziříčí, Vsetín
Zábřeh	Mohelnice, Šilperk, Zábřeh

Tab. 2 Administrative division of the Olomoucký region in 1850-1855
Source: Bartoš 1966

Jeseník district

When comparing the spatial extent of the Jeseník district we can say that the current territory is fully consistent with the territory of the political district in 1938, which was then named Frývaldov. On its territory judicial districts Cukmantl (now Zlaté Hory), Frývaldov (Jeseník), City Javorník and Vidnava were to be found in 1938. Today in the Jeseník district we find SO ORP Jeseník (in the same range as the judicial district Frývaldov), SO POÚ Javorník (combining the former judicial districts Město Javorník and Vidnava) and SO POÚ Zlaté Hory (to the same extent as the judicial district Cukmantl).

Šumperk district

The territory of the current Šumperk district was in 1938 divided between two political districts, Šumperk and Zábřeh. The political district Šumperk included judicial districts Staré Město, Šumperk and Vízemberk (today Loučná nad Desnou). The political district Zábřeh comprised of judicial districts Mohelnice, Šilperk (now Štítý) and Zábřeh. Today in the district Šumperk we find SO ORP Mohelnice (in the same range as the judicial district Mohelnice), SO ORP Šumperk (combining the former judicial districts Šumperk and Vízemberk) and SO ORP Zábřeh (combining the former judicial districts Šilperk and Zábřeh). The border between SO ORP Šumperk and SO ORP Zábřeh does not correspond entirely with the state in 1938. In addition, the Šumperk district comprehends SO POÚ Hanušovice, which is almost identical with the judicial district Staré Město. Interestingly, the district was retained, but the center changed.

Olomouc district

Total of 5 political districts functioned on the territory of the current Olomouc district in 1938, whereas some parts fell outside the current district. They were political districts Litovel, Moravský Beroun, Olomouc-city, Olomouc-country and Šternberk. The political district Litovel in the today's district included judicial district Litovel, the political district Moravský Beroun included judicial district Libavá City (now military area). Political districts Ol. city and country were identical to the judicial districts Ol. city and country and fell into the current district completely. The political district Šternberk consisted of judicial districts Uničov and Šternberk, both in the today's district. Today the Olomouc district is formed by four SO ORPs (Litovel, Olomouc, Šternberk and Uničov), two SO POÚs (Hlubočky, Moravský Beroun) and military area Libavá. More or less the same as in 1938 are now SO ORP Olomouc (with districts Ol. city and country), SO ORP Litovel (with judicial district Litovel), SO ORP Uničov (with judicial district Uničov). SO POÚ Hlubočky in 1938 had no predecessor, this territory fell under the district of Olomouc-country. SO POÚ Moravský Beroun then fall under the separate political district Moravský Beroun, and not under the Šternberk district. Today SO POÚ Moravský Beroun falls to district ORP Šternberk. This situation is relatively new. SO POÚ Moravský Beroun was affiliated to the Olomoucký region on 1st January 2005 (formerly fell to the Bruntál district, Moravskoslezský region) and has therefore no historic ties with Šternberk. Military area Libavá boundaries are almost identical with the boundaries of the then judicial district Libavá

City (with certain differences in northern and eastern part, which were probably caused by defining the post-war military area).

Přerov district

The territory of the current Přerov district was divided into two political districts in 1938, Hranice and Přerov. Political district Hranice was further organized into judicial districts Hranice and Lipník nad Bečvou and the political district Přerov was further divided in the judicial districts Přerov and Kojetín. Today in the Přerov district we find SO ORP Hranice, Lipník nad Bečvou and Přerov and SO POÚ Kojetín. The territory of SO ORP Hranice is almost identical to the judicial district Hranice. The same can be said about SO ORP Lipník nad Bečvou (almost identical to the judicial district Lipník nad Bečvou). Only the course of their mutual border slightly changed. Also SO ORP Přerov is very similar to its historical predecessors (the judicial distrikt Přerov), it was only extended in the eastern part (at the expense of then judicial district Bystřice pod Hostýnem). SO POÚ Kojetín is now smaller than the judicial district Kojetín (it was larger in the west, likely to include the current SO POÚ Němčice nad Hanou of the current neighboring Prostějov district).

Prostějov district

The change on the territory of the current Prostějov district were relatively significant. The territory was in 1938 filled with the political districts Boskovice, Litovel, Moravská Třebová, Prostějov, Přerov and Vyškov. Within the political district Boskovice a small part of judicial districts Boskovice and Blansko fell in what is now the Prostějov district. Within the political district Litovel from 1938 the whole then judicial district Konice belongs to the today's Prostějov district. From the political district Moravská Třebová the current district Prostějov has a small part of the then judicial district Jevíčko. Political district Prostějov was formed by the judicial districts Plumlov and Prostějov, whose territories are included in the present district. As already noted, in the southeastern part of the today's district is SO POÚ Němčice nad Hanou, which in 1938 fell under the judicial district Kojetín. On the district's territory two SO ORPs (Konice and Prostějov) and one SO POÚ (Němčice nad Hanou) are now located. SO ORP Konice is almost identical to the judicial district Konice (today's SO is enlarged by certain municipalities from the former judicial district Jevíčko, especially in the western part). SO ORP Prostějov includes the then judicial district Prostějov, part of the judicial district Kojetín, part of the judicial district Plumlov and parts of judicial districts Boskovice, Blansko and Vyškov. These significant changes are due to the emergence of a military training area Dědice, which was created after the World War II within judicial districts Plumlov and Vyškov and later administratively added to the Vyškov district. Its "tip" falls to the territory of the former political district Prostějov. Probably as a compensation during the reform in 1960, parts on the western side (which previously belonged to judicial districts Boskovice and Blansko) and the area of Němčice (formerly belonging to the judicial district Kojetín) were added to the Prostějov district.

Based on this detailed analysis we can generally say that the political and judicial districts in the state of its territorial definition as in 1938 were very strong inspiration for the formation of the districts in 1960, but above all in defining the administrative areas of municipalities with extended authority and with commissioned local authority. In some districts this "continuity" is clearly apparent – e.g. districts Jeseník and Šumperk, elsewhere there was a minor change, but in a large scale the political and judicial districts remained as a basis for today's administrative division - such as the districts Olomouc and Přerov. As of "discontinuity" we can talk in the Olomoucký region only in the Prostějov district, which underwent major territorial changes as an effect of the post-war definition of the military area Dědice, so its current shape does not follow the political and judicial districts in a larger extent, although even here a "base" retained.

Emergence of regional centers

In terms of formation and dissolution of regional centers in time the situation looks as follows. At the Jeseník district we find currently three self-governing centers (Javorník, Jeseník and Zlaté Hory). Vidnava was as a center abolished and no new center was created. The territory of the current Šumperk district now includes four centers (Hanušovice, Mohelnice, Šumperk, Zábřeh). Centers Vízmbek (Loučná nad Desnou) and Šilperk (Štítý) were abolished. Center Staré Město was abolished, but in the range of its scope center Hanušovice works now. No new center appeared. Olomouc district now has six self-governing centers (Hlubočky, Litovel, Moravský Beroun, Olomouc, Šternberk,

Uničov + military area Libavá). In 1938, there were six centers on its today's territory as well. Libavá City as the center SO ORP or POÚ does not work, now it is the seat of military area office. Center Hlubočky was newly established as a municipality with POÚ. On the territory of the current Přerov district there was no change in the number of centers compared with the state in 1938. Still four centers work in its territory (Hranice, Kojetín, Lipník nad Bečvou and Přerov). The district Prostějov has now three centers (Konice, Prostějov and Němčice nad Hanou) on its territory. Also in 1938 three centers (Konice, Plumlov and Prostějov) operated on the district's territory. Plumlov as the center was abolished, while the center Němčice nad Hanou was newly established.

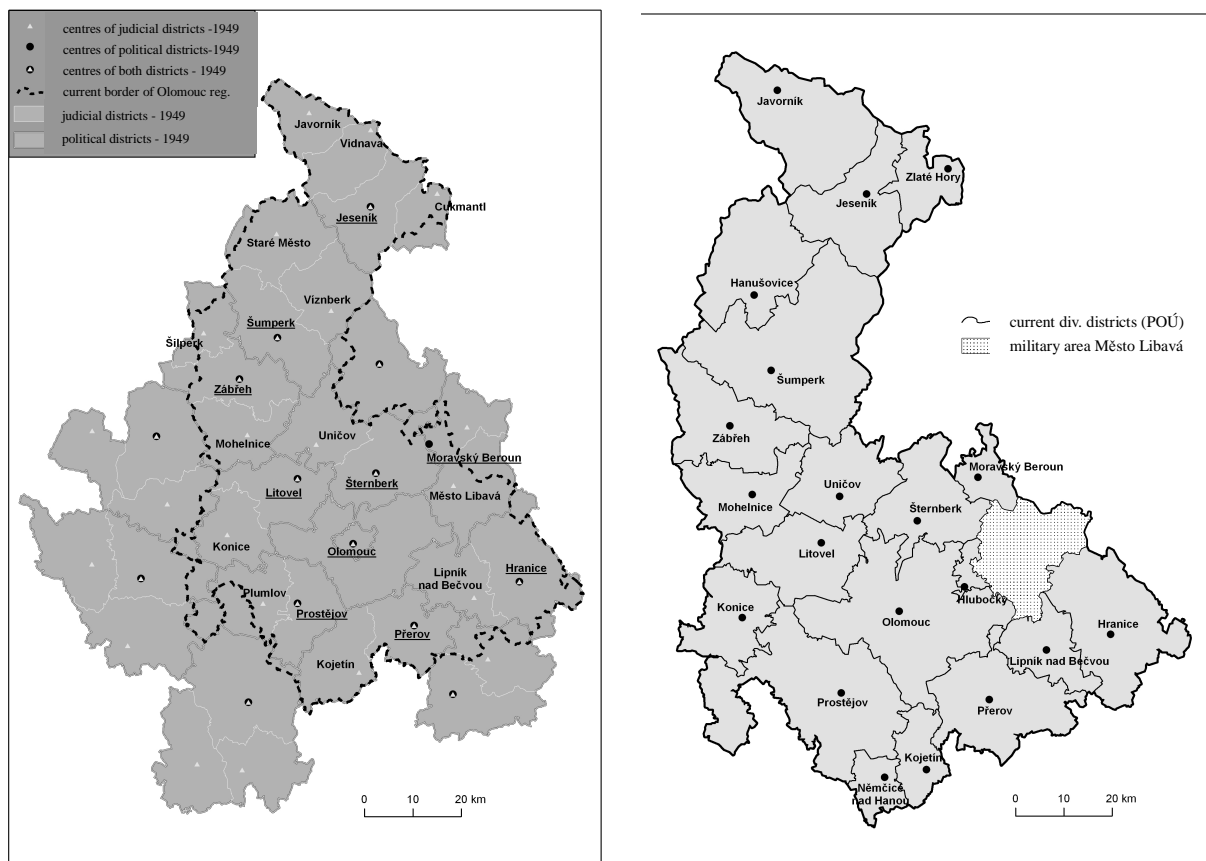


Fig. 1 Political and judicial districts as on 31st January 1949 (left) and the current administrative division of the Olomoucký region (right) Source: Czech Statistical Office: Administrative division of the Olomoucký region, Source: own project

DISCUSSION OF THE STUDY RESULTS

After processing and analysis of data of daily school commuting, we defined, according to our criteria, 21 regions, which is 3 more than in the case of labour commuting. The largest differences occur in the southern part of the region, where we determined school commuting regions Klenovice and Dřevnovice (in the southwest) and Dřevohostice region (in the southeast). The first two, Klenovice Dřevnovice, are indeed not asserted in overall daily commuting system, but the number of pupils and students of Dřevohostice region is high enough to create the region Dřevohostice even in the system of overall commuting. Another difference is reflected in the size of the school and labour regions. In particular, the county seat Olomouc creates by its ties more facilities for labour than school commuters (at the expense of Litovel, Uničov and Šternberk) and similarly Mohelnice (at the expense of a Zábřeh and Litovel).

The centers Štítý and Olšany maintain a special position. These centers are close to create their own hinterland (they lack one municipality each), but as the second most important commuting flows of communities belonging to Štítý direct to Olšany and vice versa, we have formed "double-center" nodal region Štítý - Olšany.

The picture is also clear that cities Zlaté Hory and Hlubočky do not create any commuting

hinterlands, although they are seats of commissioned local authorities, whereas there is no such office in commuting centers Dřevohostice and Štíty, and Olšany, respectively. Regions based on analysis of data of the total commuting were finally considered the most appropriate and we worked with them in further research.

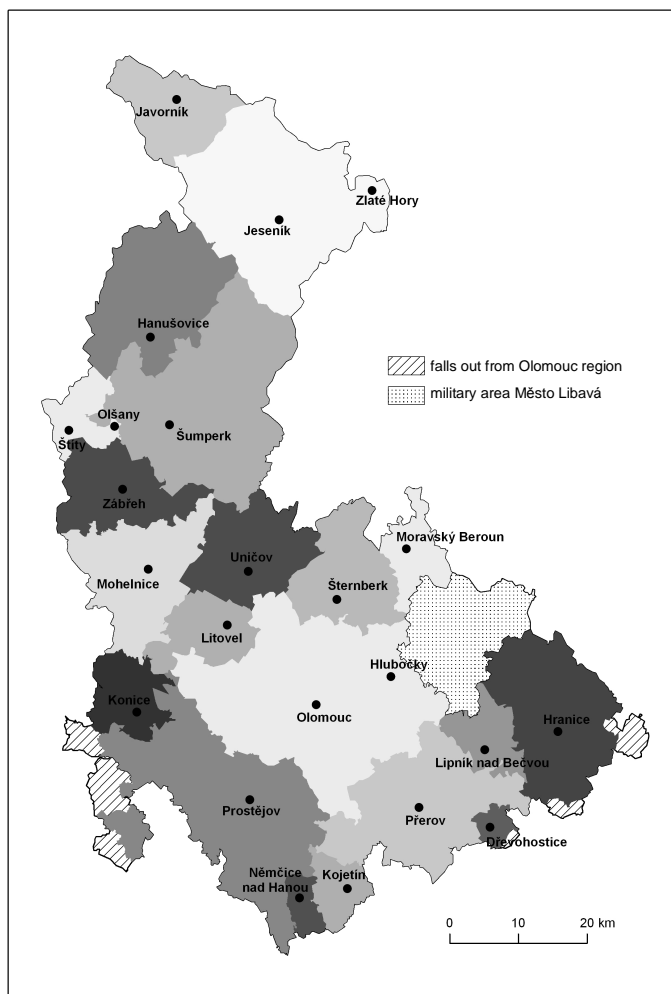


Fig. 2 Daily system of total commuting in the Olomoucký region
Source: own project

On the basis of the total labour and school commuting we defined 19 nodal regions in the Olomoucký region (see Fig. 2 and Tab. 3). The table does not include municipalities that fall to centers in neighboring regions (total of 8 municipalities) and military area Libavá.

As of the number of municipalities Prostějov creates the largest hinterland (70), followed by Olomouc (62) and Přerov (52). Dominance of Prostějov over Olomouc in this indicator is based on the one hand on the fragmented settlement structure in the Prostějov area (higher number of small municipalities) and a greater distance of competing commuting centers from Prostějov than from Olomouc on the other side. Other indicators (area, population, population density) are clearly under the dominance of the commuting region Olomouc. As of the population it is almost twice as big as the second one (the Prostějov region).

Defined as the smallest territory in the number of municipalities is the Javorník area, where only four municipalities fall to the center Javorník, as per population the smallest regions are Dřevohostice, Némčice nad Hanou and Štíty - Olšany. In case of the population density the north-south gradient is applied, where the value of this indicator declines from Olomouc, Přerov and Prostějov regions on the south to the north towards the Jesenice and Javorník regions.

NOD CENTER	NUMBER OF MUNICIPALITIES	AREA (KM ²)	POPULATION	POPULATION DENSITY (PEOPLE PER KM ²)
Prostějov	70	531,5	94 232	177,3
Šternberk	15	197,8	18 788	95,0
Jeseník	18	532,0	37 245	70,0
Olomouc	62	774,0	172 010	222,2
Hranice	30	316,9	33 249	104,9
Přerov	52	349,2	77 140	220,9
Litovel	9	122,0	15 680	128,5
Uničov	10	207,2	23 118	111,6
Konice	13	109,0	7 106	65,2
Němčice nad Hanou	7	35,7	4 060	113,7
Kojetín	6	66,8	8 920	133,5
Lipník nad Bečvou	6	87,9	11 922	135,6
Hanušovice	9	312,8	8 773	28,0
Mohelnice	19	257,4	23 355	90,7
Šumperk	25	547,1	64 555	118,0
Zábřeh	19	186,6	26 989	144,6
Javorník	5	164,7	5 234	31,8
Dřevohostice	6	25,3	2 627	104,0
Štítý - Olšany	7	76,6	4 668	60,9
TOTAL	388	4 900,4	639 671,0	130,5

Tab. 3 Nodal regions in the Olomoucký region

Source: Czech Statistical Office: Administrative division of the Olomoucký region, own project

If we were to make categorization or hierarchy of defined regions (not only according to the indicators listed in the table, but if we also take into account the location, transport links, economic potential, etc.), we get the following five levels:

- 1- *Olomoucký region - nationwide importance (having more than 170 thousand residents is among the five largest commuting regions in the Czech Republic),*
- 2- *Prostějov, Přerov, Šumperk regions - interregional significance (regions with populations ranging from 60 to 100 thousand and 500 km² area, the district towns with developed industry and network of services),*
- 3- *Jeseník, Hranice, Zábřeh regions - regional significance (regions with approximately 30 thousand residents, regional centers with industrial zones, and approximately 20 to 30 commuting municipalities),*
- 4- *Mohelnice, Uničov, Litovel, Šternberk, Lipnice - regional significance (districts with 10 thousand inhabitants, their centers are regional employment centers and seats of SO ORP),*
- 5- *Other - local importance (6 regions with a population of around 5 thousand in peripheral areas of the region).*

If we compare the definition of nodal regions with the administrative division of the region (with the level of areas with commissioned local authority), we find that in many places there are significant differences (see Fig.3). The biggest differences are in the Jesenice region, where according to our criteria we cannot define Zlaté Hory as a center (falls to the nodal region Jeseník), position of Javorník is considerably weakened, its commuting region is of half size of the area of the commissioned local authority. City of Jeseník is in this mountainous area more important center (at the expense of Zlaté Hory and Javorník) as of the daily work and school migration, which does not correspond with the definition of its POÚ area. Similar to Zlaté Hory, Moravský Beroun (seat of POÚ) can not be identified as the center of commuting, its entire area falls to Olomouc and Hlubočky - the same case. Other significant changes are reflected close to the border of Přerov and Prostějov area, where the centers of areas with commissioned local authorities Němčice nad Hanou and Kojetín form much smaller commuting areas than administrative areas. The other changes we are causing ourselves when we define a region Štítý-Olšany on the border of Šumperk and Zábřeh regions and nod Dřevohostice in Přerov area. Significant differences can be found in the Litovel area, its area is reduced by ten

municipalities in favor of Olomouc, in the Mohelnice area, where the influence of Mohelnice goes beyond the administrative border and in the northwestern part of the Prostějov area at expense of the Konice area. In other areas of the region there is more or less conformity of regions defined on the practical, daily migration ties with the administrative division of the region, in the greatest extent in the Uničov area – the nod here perfectly matches with the POÚ district.

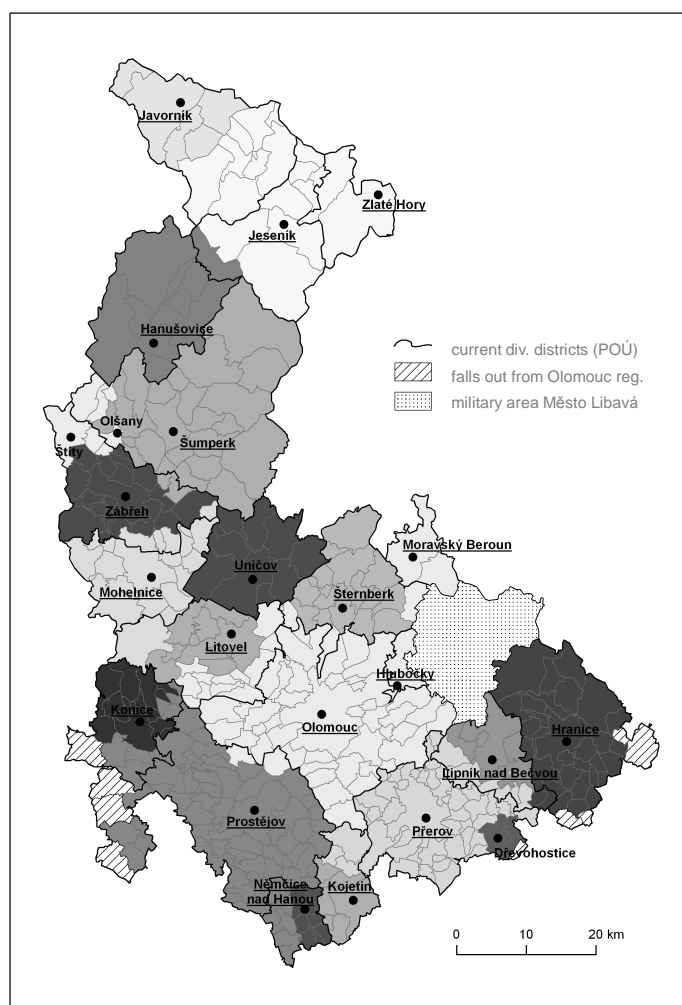


Fig. 3 Nodal regions and POÚ areas in the Olomoucký region
Source: CSO, own project

As mentioned in the opening chapters, for theoretical regionalization of the Olomoucký region we chose the Reilly's Law, namely its topographic version with use of the root of five, which seems to be the most suitable for the examined area.

Several problems occur in application of Reilly's Law with the square root on the territory of the Olomoucký region (centers are the seats of commissioned local authorities). It is clear that role of centers of lower order is suppressed – e.g. only one municipality belongs to Hanušovice, moreover this municipality divides the Šumperk region into two parts. The regions Zlaté Hory, Moravský Beroun and Hlubočky are of similarly low significance and Litovel, Konice and Náměšice nad Hanou have a small scope of influence.

Another important phenomenon is the commuting outside from the Olomoucký region. In the case of the square root it is mainly in the southwestern part of the region (the Prostějov region), which reflects the impact of Brno. This impact is suppressed (though not completely) with a use of root of 5, but it increased the role of Bystřice nad Hostýnem which as a center of the Zlín region hauls in municipalities of the Přerov and Hranice regions.

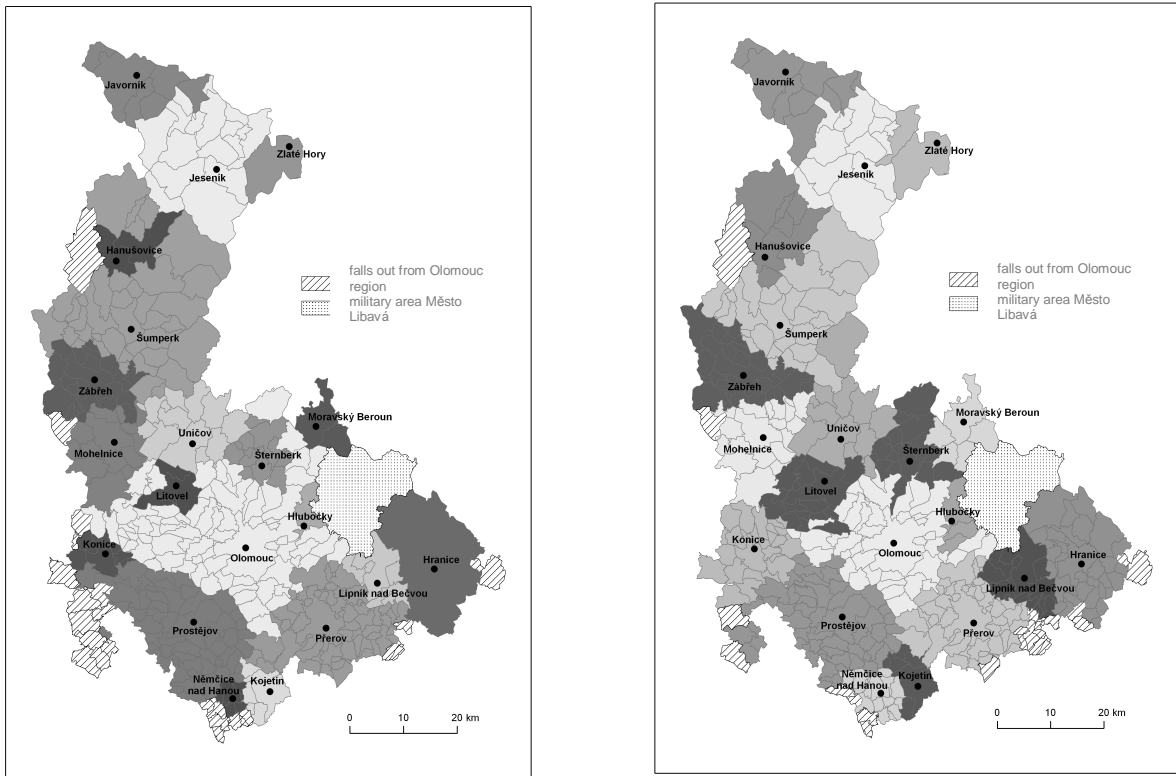


Fig. 4 Regions of the Olomoucký region defined according to the Reilly's Law, the application of square root (left) and root of 5 (right)
Source: own project

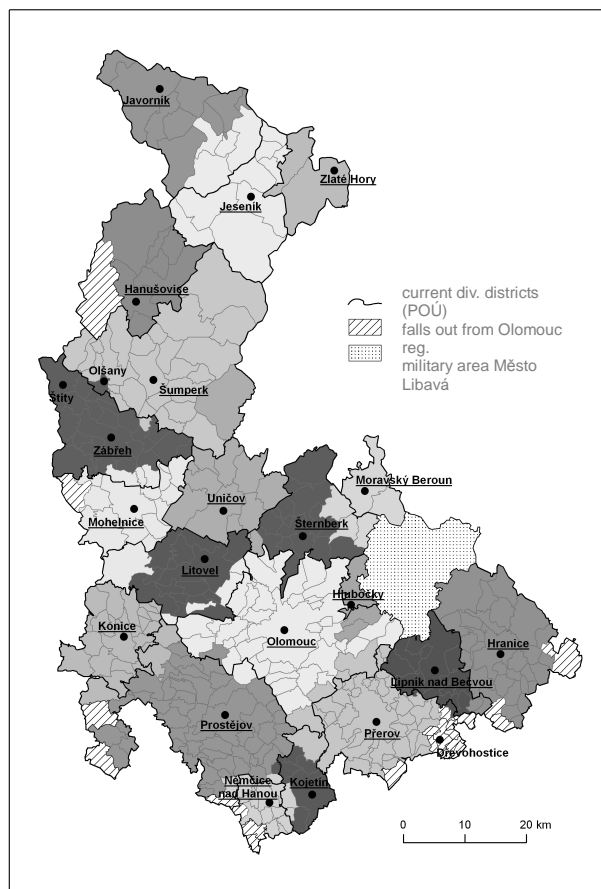


Fig. 5 Modelled regions and POÚ areas in the Olomoucký region
Source: own project

We again confront the resulting districts with the administrative division, i.e. POÚ areas (see Fig. 5). Even in this theoretical model the role of Javorník as a regional center is significantly suppressed, again "in favor of" Jeseník. Other modelled regions are much closer to administrative areas, worth noting is an even greater "influence" of Mohelnice at the expense of Zábřeh, Přerov at the expense of Olomouc and Moravský Beroun at the expense of Šternberk when applying the root of five. A slightly weaker influence has Litovel and Šternberk, otherwise only irrelevant changes appear. Theoretical districts Němčice nad Hanou and Kojetín resemble POÚ areas substantially more than was the case of commuting

SUMMARY

Administrative division of the Olomoucký region respects in most of its territory the historic borders, which functioned here in the past, particularly their course in the 1930s and 1940s (with the exception of the war period), thus borders of political and judicial districts. Their relation to current administration areas of municipalities with extended authority and areas with commissioned local authorities is more than obvious. The largest changes occurred along the borders of the Přerov and Prostějov districts (Němčice nad Hanou x Kojetín), changes in the definition of the regional centers occurred in the Jeseník (Vidnava) and Šumperk (Staré Město x Hanušovice, Štítý, Vízemberk) regions.

In the region we have delimited 19 nodal regions on the basis of labour and school commuting and 20 modelled areas according to the Reilly's Law, which are more or less similar to the area of municipalities with commissioned local authority. The most problematic region appears to be the Javorník region, whose role (influence of Javorník city) is, in our opinion, overestimated, since the practical and theoretical links of a half of municipalities of the administration area of Javorník are directed to Jeseník. Another interesting area is the southwest of the region, part of the Prostějov region, where we find municipalities that based on commuting and even theoretical links do not belong to the Olomoucký region (according to commuting they fall to Blansko, theoretical influence of Brno is also evident). The same problem applies to the border of Přerov and Lipník regions (three villages belong according to all criteria selected by us to the sphere of influence of Bystřice pod Hostýnem) and the municipality of Hustopeče nad Bečvou (theoretically and practically falls to Valašské Meziříčí). In other parts regions are more or less identical or only slightly different (in one or two municipalities) from administrative districts.

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