Rural Areas—Boroughs under Pressure and Free Riders

Evidence from Poland

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Introduction

The share of the population living in rural areas decreased from 70% to 46% between 1950 and 2014. The developing countries are predominantly rural with 52% of the population living in the rural areas as of 2014, of which 88% is concentrated in Asia and Africa (UN 2015, 21, 38). In the developing countries, the rural-urban gap is substantial from the perspectives of socio-economic conditions measured by indicators describing education, health and living standards (OECD 2016, 20-21).

On the other hand, the developed countries experienced the urbanization process much earlier. They had a share of rural population of 46% in 1950 and it declined further to only 22% in 2014. In Europe, 27% of population lived in rural areas in 2014. Among the European Union (EU) countries, the lowest ratio was in Belgium (2%), Malta (5%), Iceland (6%) and the Netherlands (10%). The highest was in Romania and Slovakia (46%). In the 'new' Central European EU members[1], the share of the rural population is not only high, but is also relatively stable—it remained at the level of 39% from 2005 to 2015 (UN 2015, 38, 50, 233).

Regardless of a country's level of development, there is a general tendency for urbanization to be accompanied by higher economic growth which leaves behind the rural population. Although the causality is not obvious and the patterns of income growth vary across countries, the urban areas as the centers of economic activity are characterized by higher incomes (UN 2015, 34). The new economic geography models, using the idea of spatial concentration of economic activities, support arguments that productivity will not necessarily converge over the medium and long term between urban and rural regions, as the final outcome depends on agglomeration economies, transport costs and diseconomies of scale (see, e.g., McCann 2013, chap. 3). According to the post-Keynesian theories of regional development, the regional divergence is also a likely outcome of economic development (see, e.g., Krugman and Venables 1995). As expressed explicitly by Gunnar Myrdal, "the play of the forces in the market normally tends to

increase… the inequalities between regions" (Sheppard 2017, 972). This creates pressure on the rural areas which are nominally or relatively less affluent than municipalities and as a result experience migration/demographic pressures from urban areas.

The OECD data shows that the spread of growth in GDP, GDP per capita and productivity in the 1995-2005 period varied among regions by more than 15 percentage points in the OECD countries as a result of factors such as, among others, geography, demographics, productivity, human capital, innovation capabilities and infrastructure. Agglomerations do not necessarily lead to sustained high growth rates and several rural regions out-performed urban regions in terms of GDP per capita (OECD 2009, 2-4).

Alternatively, the comprehensive investigation of 1,503 regions of 82 countries, conducted by Gennaioli et al. (2014), shows that the regional convergence happens at an annual rate of 2.5%. On average, regional growth and convergence are faster in richer countries. The geographic location within the country matters as the research reveals slow mobility of capital in response to within-country return differentials.

The analysis conducted for the OECD countries for the period 1980-2005 brought different results. It showed that in approx. one-third of the countries, regional inequalities in GDP per capita increased and in the other one-third of countries they declined. For the remaining countries there was no clear trend (OECD 2009, 4).

For the European Union countries, the regional cohesion policies are the main instruments for "reducing disparities between the various regions and the backwardness of the least-favored regions" as defined in the 1986 Single European Act. Their goals were extended to "economic, social and territorial cohesion" as stated in the Lisbon Treaty. In the 2014-2020 Financial Perspective, the European Commission allocated EUR 371.4 bn (after amendments) for such policies, which constitute 34% of the total EU budget for the 2014-2020 period. The eligibility and financial allocations for the regional policies are largely determined on the NUTS-2 level.

There are several pieces of research devoted to evaluation of effectiveness of the EU regional policies. Their recent brief review is presented in Fratesi and Wishlade (2017). The research findings range from the policies' immediate positive impact on reducing disparities between core and peripheral areas in Europe, through positive impact over time, to the neutrality of the EU regional policies or even the negative impact on growth (the latter are presented in, for example, Bouayad-Agha et al. 2011; Puigcerver-Peñalver 2007).

Boldrin and Canova (2001) in their broad statistical analysis of the regions in EU15 countries from the 1980s till 1996 showed that there is no evidence of either decreasing or growing disparities between regions. The EU regional policies are mainly redistribution policies driven by political, not economic, factors. Similarly, an assessment of the EU cohesion policy in Italy conducted by Aiello and Pupo (2012) showed that despite the higher impact of structural funds on underdeveloped regions, they did not manage to reduce the long-lasting productivity differences between the South and the Centre-North of the country.

However, most of the research shows a positive impact of the EU regional policies, emerging over different time horizons. A summary of the quantitative results of 17 research papers is presented in (Dall'Erba and Fang Fang 2017). The authors also provide an explanation why the results of different studies vary to such a large extent. Heterogeneity comes from, among others, the period examined, the control of endogeneity, and the pres-

ence of several regressors other than Structural Funds. They point out that "more attention could be given to locally weighted estimates of the funds… to provide coefficient estimates for every single region, as opposed to the average impact for the entire sample" (Dall'Erba and Fang Fang 2017, 831). This helps to reconsider the currently prevailing approach of "one size fits all" in allocation policies and research literature.

Research focused on an assessment of the performance of regions with a different profile was carried out by Dijkstra et al. (2015). It showed that in the EU the rural remote regions and the urban regions were more vulnerable to the crisis which started in 2007-2008. From the perspective of GDP, productivity and employment indicators, the results do not support the models of regional convergence. The city-led growth pattern, which prevailed before the crisis, was also inverted as a result of the crisis. The relative beneficiaries during that period were the intermediate regions and the rural regions close to municipal areas.

Gagliardi and Percoco (2017) carried out research on the heterogeneous local responses to the 2000-2006 European Cohesion Policy. The analysis was undertaken at NUTS-3 level, which showed that specific areas that should not be eligible for the policy support, as characterized by the 75% of the EU average GDP per-capita threshold, received the funds because the eligibility criterion was applied on a broader geographical scale (based on NUTS-2 typology). Such an "inadequacy" had vital implications for some regions. Specifically, it was beneficial for the rural areas close to urban centers. Due to a combination of such factors such as support of the EU funds, geographical location and availability of space to accommodate the flow of people and new activities, they outperformed not only more dispersed rural areas but urbanized and suburbanized areas as well.

As presented above, the topics of urban-rural convergence/divergence and the choice of relevant policy instruments are complex and deliver mixed analysis results in the research literature. Nonetheless, the convergence among regions may not happen by itself as an outcome of pure market dynamics. For the policy makers, this creates a significant challenge to design regional policies which enable convergence aimed at a reduction of disparities in income, infrastructure stock, employment, and the like.

In this paper, we intend to deepen the knowledge on factors which lay behind the performance of various rural regions. Acquiring information on significant differences in the profiles of rural areas is the key to designing and implementing well-tailored policies supporting regional convergence. As shown in the research by Dijkstra et al. (2015) and Gagliardi and Percoco (2017), more detailed geographical analyses unveil several significant heterogeneities in the profiles of regional units which affect the outcomes of the rural cohesion policies.

Analyses in this paper are carried out for the LAU-2 level (corresponding to the former NUTS-5 level), which encompass approx. 1500 rural boroughs in Poland. Using this approach, we intend to contribute to the existing literature by showing the different profiles of rural areas. Specifically, the rural boroughs close to major municipal areas display the features of free rider behavior. This is a completely different profile than in the case of remote rural areas, which strive for economic and social sustainability. Such findings would imply reconsidering the criteria for regional policies for a more context-dependent approach in order to channel funds to such rural local governments which are truly subject to demographic and economic pressures.

The rest of this paper is organized in two major sections. First, we describe the economic and demographic trends in local governments in Poland during the 2007-2016 period. Such descriptive statistics depict general tendencies; however, they are not sufficient to identify possible heterogeneity within the category of rural boroughs. Then, based on the data encompassing several dimensions of sustainable development (social, demographic, economic, environmental, etc.), we test hypotheses that distinctive profiles of rural areas actually exist, namely boroughs under pressure and boroughs free riding on adjacent municipal areas. The econometric analyses are performed with the use of logit models, which are suitable tools for estimating binary dependent variables.

Data and Methodology

The quantitative analysis in this paper is conducted for local governments (LGs) in Poland, which corresponds to the LAU-2 territorial typology by Eurostat (formerly NUTS-5). There are 2,808 LG entities as of 2016 in Poland. They form a three tier system which consists of boroughs, counties, and provinces. The largest towns (66 entities at the end of 2016, including province capitals) perform both the functions of boroughs and counties, and they form a separate category called 'towns with county rights.' Boroughs are split into three categories: municipal boroughs, municipal-rural boroughs and rural boroughs. The rural boroughs, the most numerous category with 1,559 entities in 2016, are defined as the areas which are composed only of villages and minor settlements—they cannot not contain urban areas with municipal rights.

Data regarding local governments used in Part 3 of this research comes from the BESTI@ system run by the Ministry of Finance of Poland, and Kluza (2017)—financial indicators and their definitions, and from the Central Statistical Office, GUS—demographic and labor statistics. The sources of the data used in Part 4 are indicated in Table 1.

Econometric modelling in our research is conducted with the use of the logistic regression (logit) model. Logit models are dedicated and widely used for modelling the discrete dependent variables (see, e.g., Verbeek 2002, chap. 7; Greene 2000, chap. 19). Below is a short description of this method. In our case, we model a binary variable i.e.:

$$Y_i = \begin{cases} 1, if\ a\ rural\ borough\ satisfies\ a\ specifc\ condition(s) \\ 0, otherwise \end{cases}$$

The conditions analyzed for the rural boroughs are presented in the Part 4. The logistic function has the following form:

$$p_i = P(Y_i = 1|X_i; a) = \frac{1}{1 + e^{-Z_i}} = \frac{e^{Z_i}}{1 + e^{Z_i}}$$

where:
Z - a linear function such that $Z_i = a_0 + a_1X_{1i} + a_2X_{2i} + \cdots + a_kX_{ki} + \varepsilon_i$
i – number of observations
X_{k} – independent variables

k = 1, 2, …, n number of variables
a_k – coefficients
a_0 – constant

Logit is the logarithm of the odds ratio $\frac{p_i}{1-p_i} = e^{Z_i}$ i.e.:

$$ln\frac{p_i}{1-p_i} = lne^{Z_i} = Z_i = a_0 + a_1X_{1i} + a_2X_{2i} + \cdots + a_kX_{ki} + \varepsilon_i$$

To check the prediction properties of a model, the accuracy ratio R_P^2 (the ratio of correct predictions to all predictions) is measured, where theoretical $\hat{p}$ values are calculated as:

$$\widehat{p_i} = \frac{e^{\widehat{Z_i}}}{1 + e^{\widehat{Z_i}}}$$

For the unbalanced samples, where the share of Y_i=1 in the sample is not equal to 0.5, which is the case of this research, it is important to calculate the adjusted accuracy ratio with:

$$\widehat{Y_i} = 1 \; when \; \widehat{p_i} > \gamma$$

where γ is the share Y=1 in the sample.

There are two basic ways of interpreting model results. The sign of a_k coefficient reflects an impact's direction of independent variable on the probability of Y=1. The impact magnitude of a given variable change on obtaining the probability of 1 by the dependent variable is measured by a marginal effect, defined as:

$$\frac{\partial p_i}{\partial x_{ki}} = \frac{\partial \frac{e^{Z_i}}{1 + e^{Z_i}}}{\partial x_{ki}} = a_k p_i (1 - p_i).$$

Characteristics of the Local Government Sector in Poland in 2007-2016—The Financial and Demographic Strains

Local governments (LGs) play an important role in national economies, providing public services and carrying out investment, especially in infrastructure. In the European Union (EU) countries, LG revenue amounted to 13.7% of GDP in 2015, remaining at a stable level of 13-14% of GDP over the last ten years. The sector was a noticeable player in the stimulation of domestic demand during the 2008 post-crisis period. Its share in total investment in the EU grew from 7.0% in 2006-2007 to 9.2% in 2010. In 2014-2015 it stabilized at a relatively high level of 8.3%. The unchanged revenue base combined with increased investment efforts resulted in a lasting adverse impact on the finances of LGs across the EU. Their average debt/GDP ratio grew significantly, from less than 5% in 2007 to 7.5% in 2015.

Similar processes took place in the LG sector in Poland. The crisis resulted in increased LG indebtedness and raised concerns over the sector's debt repayment capacity. The operating surplus dropped from 13% of revenue in 2007-2008 to 6% in the 2010-2011 period and the debt to revenue ratio grew from 20.2% in 2008 to 38.4% in 2011, eventually dropping to 32.3% in 2016. All LG categories in Poland are also vulnerable to interest rate risk. The analysis with the application of Monte Carlo simulations showed that even an increase of market interest rates back to the level of 2013, combined with a certain increase in operating expenses, may cause deep financial strains for over 300 LGs (Kluza 2016).

The crisis also had an adverse impact on the LGs from a demographic and social perspective. Although the total population in Poland grew by 0.4% during 2007-2016 according to official statistics, taking into consideration the methodology change after 2010 (plus approx. 350,000 people) and the size of temporary migration, which proved to be permanent (over 2 m people), the real picture was worrying. Adjusting for these factors, Poland experienced a decline of approx. 6% of the domestic population over the 10-year period. This was partially caused by the adverse situation on the domestic labor market. Unemployment (GUS data) grew from 11.2% in 2007 to 13.4% in 2012. At the end of 2016, it dropped to 8.3%. Contrary to labor trends, the GDP per capita was growing steadily in Poland.

The above phenomena had a diverse impact on the individual LG categories in Poland. Contrary to some common views, the adverse impact of the economic downturn on the rural areas was mixed and, specifically from the financial perspective, it was relatively limited. On average, the rural boroughs emerged from the crisis with the most favorable financial standing among all LG categories in Poland, with an average net debt/revenue ratio of 10.8% and an EBITDA/gross interest ratio of 18.8 in 2016. The worst situation was experienced by large towns (i.e. towns with county rights), whose average net debt/revenue ratio reached 32.2% and the EBITDA/gross interest ratio was significantly lower: 8.0 in 2016. The stronger financial standing of rural boroughs was possible, among others, due to the EU structural funds directed to underdeveloped areas as well as to the specific statutory debt limit formula in Poland, which favored debt-driven investment in large municipalities, which resulted in their higher indebtedness.

The rural boroughs also had significantly higher operating surpluses. Their primary operating surplus relative to revenue amounted to 11.9% (the record low in 2010 was 9.5%) compared to 9.5% for towns with county rights (the record low was 6.2% in 2010). Similarly, demographic processes were more favorable in the rural boroughs. The population of rural boroughs grew from 2007 to 2016 by 4.1%, compared to a 1.9% decline in the towns with county rights, of which a 0.3% decline was recorded in 16 province capitals.

On the other hand the labor indicators showed a relatively inferior profile of the rural boroughs. They are characterized by higher unemployment (6.7% in 2016) and lower salaries (82.3% of the national average) than towns with county rights (5.1% and 95.7%, respectively) or province capitals (4.3% and 103.4%, respectively[2]). These differences decrease somewhat when we select only rural boroughs adjacent to province capitals—they have a 6.0% unemployment rate and 84.0% average salary level. The remaining rural boroughs have a 7.2% unemployment rate and 81.0% average salary level.

Similar differences between remote rural boroughs and those close to larger cities are visible in their financial statistics, for example, in higher gross operating surplus relative to revenue by 1 percentage point in the letter. Such statistics indicate that the profile of rural boroughs in Poland may be diverse depending on their locations or different characteristics. In Part 4 of the paper, we evaluate different factors which may affect rural boroughs and their development sustainability.

Modelling the Different Profiles of Rural Boroughs

In this section we present the design and results of the econometric modelling of different profiles of rural boroughs. When studying the idea of under pressure regions, we refer to the general framework of development sustainability. According to the vastly popular definition, the development is sustainable if, "it meets the needs of the present without compromising the ability of future generations to meet their own needs" (UN 1987, 16). There are various aspects of sustainability and its measurement. They cover such areas as, among others, poverty, governance, health, education, demographics, natural hazards, economic development, consumption and production patterns etc. They also encompass the infrastructure and quality of living indicators, for example, the proportion of population using an improved sanitation facility is one of the six core indicators within the theme of poverty (UN 2007).

These indicators were mainly designed to develop and measure relevant policy at a country level. Several of them might be straightforwardly adjusted to the regional policies context. At the local government level, they are typically grouped in demographic, economic and environmental categories. Specific indicators for analyzing rural development in Poland, Central European and other countries are presented, for example, in Adamowicz and Smarzewska (2009), Borys (2008), Pavlíková (2009), and Silva et al. (2017). The indicators used in this research are shown in Table 1.

The first designed model in this research aims to capture the properties of the rural boroughs which are located close to larger municipal areas. The dependent variable Υ equals 1 when the distance from the administrative seat of the rural borough is no more than 50 km from the center of a province capital city and/or a rural borough is directly adjacent to a borough containing a province capital. 654 rural boroughs satisfy these conditions. Otherwise $\Upsilon = 0$. So the analyzed relationship in Model 1 is conditional only on the distance parameter.

The other two models model are designed in order to capture the properties of boroughs which might be hindered from achieving sustainable development. For Models 2 and 3, we define the dependent variable purely on the basis of demographic parameters in order to limit the potential questions on causality direction between dependent and exogenous variables. To catch possible effects of discontinuity in the dependent variable (see, e.g., Gagliardi and Percoco 2017) we decided to build two models of boroughs that are under demographic pressure using the population dynamics and share of population in the post-production age parameters. On average, the population in Poland decreased by 0.3% between 2012 and 2016 and the share of population in the post-production age amounted to 20.2% in 2016.

Model 2 reflects 'strong' demographic pressures: Υ equals 1 for the rural boroughs which experienced a cumulative population decline of more than 3% since 2012 and/or have more than 22% of the population in the post-production age. 255 rural boroughs satisfy these conditions. Otherwise $\Upsilon = 0$.

Model 3 reflects 'moderate to strong' demographic pressures: Υ equals 1 for the rural boroughs which experienced a cumulative population decline of more than 2% since 2012 and/or have more than 21% of the population in the post-production age. 457 rural boroughs satisfy these conditions (obviously including 255 rural boroughs with 'strong' demographic pressures). Otherwise $\Upsilon = 0$.

The dependent variables from Model 1 and Models 2-3 are not mutually exclusive sets, which would facilitate formulating distinctive models. It is possible that an individual rural borough, which is located close to a large municipality simultaneously experiences the negative demographic trends. Indeed, 76 rural boroughs satisfy the $\Upsilon = 1$ condition for both Models 1 and 2, and 143 rural boroughs satisfy the $\Upsilon = 1$ condition for both Models 1 and 3. Despite this fact, the econometric modelling delivered distinctive, statistically significant models for each rural borough profile.

The econometric modelling was carried out within a 'from general to specific' approach based on the achieving significance of individual variables, minimizing the information criteria (Akaike's and Schwarz's) and obtaining the accuracy ratio above the mean value of the dependent variable. Calculations were carried out with the Gretl software, ver. 1.9.90. In Tables 2-4 final models are presented which satisfy these criteria. It was possible to obtain models with higher predicting accuracy, however they consisted of some statistically insignificant variables, as well. This would impede the parameter interpretation and, thus, they are not presented.

Discussion of the Results

The conducted analyses confirm that rural boroughs are not homogenous. Geographic location as well as demographic trends proved to be the substantial differentiating factors within the broad category of rural boroughs. These two factors coincide with each other and also exert a significant impact on their finances, public infrastructure and private business activity. A summary of the impact of significant variables on the rural borough profile is presented in Table 5.

In the case of the rural boroughs located within the 50 km range from the centers of province capitals, their neighboring location visibly constitutes a pro-development feature. First of all, it results in their growing population. This variable has the strongest marginal effect of all variables. While this is not a result of a higher birth-rate, which amounts to -0.09 per 1000 inhabitants and is close to the national average of -0.15 and much better than in the under pressure rural boroughs with birth rates of -5.52 and -4.43, respectively, it is a result of the migration of people of working age to these boroughs. Consequently, despite their growing populations, they are characterized by a lower proportion of people of the pre-working age than an average rural borough in Poland.

The analysis shows that the profile of rural boroughs adjacent to province capitals has properties of free rider behavior from the perspective of available social infrastructure and business prospects. Due to the proximity to large municipal markets, these boroughs are characterized by a larger number of businesses per inhabitant and higher salaries than in other rural boroughs. In addition, from the infrastructure perspective, these neighboring boroughs record positive, over proportionate trends in constructed apartments and improved communal infrastructure (higher percentage of population covered by the water supply network). They also have above-average access to preschool education for children. The number of pupils per class in elementary schools is higher than average, which corresponds to a nominally large pupil population. Access to basic healthcare facilities is above the average for the rural boroughs (4.1 medical clinics per 10 thousand inhabitants compared to an average ratio of 3.9 for the rural boroughs). In addition, the adjacent rural boroughs have easy access to healthcare facilities in large towns, where the availability of medical services is twice as high (8.2 medical clinics per 10 thousand inhabitants).

Remarkably, these rural boroughs adjacent to province capitals are not very affluent, which reflects the negative sign of the coefficient for the LG revenue per capita variable. Despite this, they are characterized by a higher ratio of the gross operating surplus to revenue (11.0%) than the rural boroughs under pressure described below (8.8% and 8.9% respectively) and other rural boroughs (10.4%). This finding confirms that their relatively favorable situation from a demographic, labor and social perspective is the result of some free riding effects on the infrastructure and business opportunities provided by the large towns.

The boroughs under pressure were selected based on the two sets of demographic criteria—the more stringent, which revealed around 17% of such rural boroughs, and the liberal criteria which indicated that approx. 30% of rural boroughs in Poland might have such a profile. Regardless of the approach, the models carried out showed that there are similar specific properties of boroughs which are associated with the under pressure profile.

Most of all, distance matters, despite our current era of communication advances. The further the capital of the province, the less favorable situation for the rural borough. In the case of the 'strong' under pressure boroughs, even the distance from the towns with county rights matters. Not surprisingly, there are significantly fewer businesses per capita in these areas as well.

Secondly, the negative population trends are not only the effect of domestic migrations, but are accompanied by a deteriorating age structure of the population. There is a very meaningful relationship between under pressure rural areas and the low share of population below production age in the total population.

Thirdly, the variables reflecting the social and infrastructure situation clearly paint a troubled picture from several distinct perspectives. Namely, despite depopulation, these boroughs are characterized by an inferior profile in terms of the number of dwellings per inhabitant as well as fewer dwellings available with sewage facilitates. Also, there is poorer availability of kindergartens, despite the shrinking number of children. In addition, inhabitants of these boroughs rely much more intensively on state social aid. The only

indicator in this category which has a similar sign as in the free rider category is the one representing the provision of the basic healthcare services. Nominally, these indicators in the under pressure rural boroughs are higher than in the 'free rider' rural boroughs (4.4-4.7 compared to 4.1 for free rider rural boroughs). However, one has to notice that this 'advantage' of the under pressure rural boroughs may be illusionary—they do not have convenient access to healthcare services in large towns, which are within commuting distance for inhabitants of the 'free rider' rural boroughs.

From the financial perspective, the under pressure rural boroughs are characterized by higher budget expenditures per capita despite the fact that they offer fewer public goods to their inhabitants. In the case of the 'strong' under pressure rural boroughs (Model 2), they are also characterized by higher indebtedness relative to their revenue. This clearly creates future negative pressure on their budgets.

There are also some differences between the two analyzed categories of the under pressure rural boroughs. The one which should be stressed is the touristic profile of the borough. Model 2 showed, unsurprisingly, that the 'strong' under pressure rural boroughs clearly do not have a touristic profile. However, it is worth stressing that the tourism variable was not a significant differentiator for the model describing 'moderate' under pressure rural boroughs. This shows that a touristic profile of the borough does not guarantee its sustainability, in particular from the demographic perspective. It could just as likely be a sort of trap if it leads to a mono-sectorial profile of the borough (and specifically in such a case dominated by tourist facilities owned by non-residents of the borough).

The joint analysis for the under pressure rural boroughs reveals an unsustainable profile of these entities—negative demographic trends, inferior social and infrastructure indicators and financially strained local government budgets are phenomena interacting with one another.

In the absence of government intervention, these factors automatically create negative spillovers and exacerbate the adverse demographic, infrastructural, and ultimately budgetary trends in these rural boroughs. Market mechanisms are unlikely to result in their convergence to national living standards and they require dedicated and more individually tailored governmental counter strategies within the cohesion policy context.

Conclusion

The research confirms that much stronger differentiation criteria and instruments should be applied to current cohesion policies, confirming the findings of Dall'Erba and Fang Fang (2017). The approaches based on the NUTS-2 and NUTS-3 or even LAU-1 levels are not sufficient to identify which areas need regional support. On the contrary, a too general analysis, consequently leading to the use of common support instruments, can only lead to an increase in regional inequalities and imbalances.

It is important to notice that the profile of rural boroughs close to large cities, characterized as free rider, is quite common. In Poland, it may well illustrate around 40% of rural boroughs according to the model shown in this paper. This group of entities may still expand in the future due to further improvements in means of communication

and reduced transportation costs. The research extended the findings of Dijkstra et al. (2015) and Gagliardi and Percoco (2017) on the heterogeneous profile of rural areas and the privileged position of the boroughs adjacent to large towns. We found that the 'free rider' group of rural boroughs does not require considerable support from regional policies as it is performing well from the demographic and infrastructure perspective. On the contrary, it creates pressure on municipal areas by utilizing their business and social infrastructure, and by draining their population. Thus, cohesion policies for rural development with the 'one size fits all' approach may only further deepen the imbalances between such rural and urban areas.

On the other hand, we identified other distinctive groups of rural areas, which are systematically depopulated peripheral boroughs. They suffer from several negative spillovers created by adverse trends in demographics, limited infrastructure stock and public services availability, and budget strains for local authorities. Depending on the severity of demographic pressures, these groups encompass from 17% to 30% of rural boroughs. They require support from regional policies, otherwise the negative tendencies may autonomously deepen. One of the important findings is that regional policies should not support a specific single profile of activity, e.g. tourism. Such an economic and infrastructure monoculture also does not guarantee the sustainable development of a given borough.

The strong differentiation of rural borough profiles presented in this paper supports the postulate of Gagliardi and Percoco (2017) for the need for a reconsideration of the criteria for regional cohesion policies, specifically in order to design context-dependent (such as place-based) regional policy instruments instead of the currently prevailing approach of 'one size fits all' allocation policies. Disregarding this differentiation creates the risk of not only directing resources to less effective uses in regional policies, but also of promoting damaging competition against municipalities with potentially adverse consequences for their finances. Since the Cohesion Policy is a common program for all EU members, the results and conclusions from our research should be validated by models for other EU countries. Primarily, these patterns should be checked in the Central European EU members, where the share of rural population is significantly higher than in Western Europe and, consequently, the damage or lost benefits from misdirected regional policies might be more harmful.

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Notes

1. Bulgaria, Czech Rep., Hungary, Poland, Romania, Slovakia.
2. Non-weighted averages.

Table 1. Variables used in modelling rural borough profiles

Variable	*Description*	*Source*
Location		
dist_TWCR	Distance to the nearest town with county rights (km)	*OE*
dist_Province	Distance to the nearest province capital city (km)	*OE*
*tourist**	Number of bed places in tourist facilities (2016). The scale: 0 – for 10 beds and less 0.2 – <11; 100) beds 1.0 – <101; 500) beds 2.0 – <501; 5000) beds 3.0 – for over 5000 beds	*GUS*
Demographics		
birth_rate	Natural population change per 1000 persons (2016)	*GUS*
pop_dynamic	Population dynamic for the 2012-2016 period	*GUS*
pop_pre_prod	Share of the population of pre-working age in total population (2016)	*GUS*
pop_prod	Share of the population of working age in total population (2016)	*GUS*
pop_post-prod	Share of the population of post-working age in total population (2016)	*GUS*
pupils_in_popul	Pupils in primary schools per 1000 inhabitants (2015)	*GUS*
Business and Labor		
firms_pc	Business registered in REGON per 1000 inhabitants (2016)	*GUS*
salary	Monthly gross salary—compared to national average (Poland = 100); data for the counties (2015)	*GUS*
unempl	Share of the registered unemployed in the working age population (2016)	*GUS*
Social and Infrastructure		
apartm_LTchg_pc	Dwellings completed per 1000 inhabitants—long-term change (2005/2006 avg. to 2015/2016 avg.)	*GUS*
apartments_pc	Dwellings completed per 1000 inhabitants (2016)	*GUS*
English	Pupils with English language classes at primary schools as % of all pupils at primary schools (2015)	*GUS*
HealthBasic	Health out-patient entities per 10 thousand population (2016)	*GUS*
house_aid_pc	Housing aid transfers per 1000 inhabitants (2015)	*GUS*
kind_garten	Children of age 3-6 years covered by preschool education (2014)	*GUS*
pupils_per_school	Pupils per class in primary schools (2015)	*GUS*
SocialAid	% of community social assistance recipients in total population (2015)	*GUS*
sewer	Persons using sewage system as % of total population (2015)	*GUS*
water	Persons using water supply system as % of total population (2015)	*GUS*
Local Government Financials		
Rev_pc	LG current revenue per capita (2016)	*MF, GUS*
Debt_pc	LG debt per capita (2016)	*MF, GUS*
Debt_Revenue	LG debt as a % of current revenue (2016)	*MF*
Exp_pc	LG current expenditures per capita (2016)	*MF, GUS*
Invest_avg_pc	LG capital expenditures per capita (average for 2014-2016)	*MF, GUS*
Surplus_pc	LG surplus per capita (2016)	*MF*
Surplus/Revenue	LG surplus/deficit as a % of current revenue (2016)	*MF*
Environmental		
forest	Share of forest areas in the total area of rural borough (2016)	*GUS*
water_usg	Consumption of water in households from water supply systems per capita in m^3 (2016).	*GUS*

abbreviations: GUS—Central Statistical Office, MF—Ministry of Finance, OE—own elaboration (based on geo coordinates)

* the 'tourist' variable was standardized into 5 brackets due to its very high coefficient of variation (503%)

Source: own analysis.

Table 1. Model 1—Logit regression results for the rural boroughs adjacent to a province capital
n = 1509; omitted incomplete observations: 50; Dependent variable (Y): Free_Rider

	Coefficient	*Stand. error*	*z*	*p-value*	*Marginal effects*
const	-18.3049	3.09982	-5.9051	<0.00001***	
salary	0.024242	0.0069543	3.4859	0.00049***	0.00588707
pop_dynamic	14.7788	3.57543	4.1334	0.00004***	3.58897
pupils_per_school	0.0458313	0.0221022	2.0736	0.03812**	0.0111299
apartm_LTchg_pc	0.103627	0.0426614	2.4291	0.01514**	0.0251654
pupils_in_popul	0.0216438	0.00917391	2.3593	0.01831**	0.00525611
kind_garten	0.0138771	0.00472083	2.9395	0.00329***	0.00336999
firms_pc	0.0113192	0.00347801	3.2545	0.00114***	0.00274882
forest	-0.0150459	0.00365363	-4.1181	0.00004***	-0.00365383
water_usg	-0.0262175	0.00568537	-4.6114	<0.00001***	-0.0063668
water	0.0206264	0.0038593	5.3446	<0.00001***	0.00500903
pop_pre_prod	-0.0894899	0.0508882	-1.7586	0.07865*	-0.0217322
Rev_pc	-0.532661	0.128267	-4.1527	0.00003***	-0.129354
HealthBasic	0.112613	0.0307881	3.6577	0.00025***	0.0273477

Mean dependent var	0.422797	S.D. dependent var	0.494167
McFadden R-squared	0.137243	Adjusted R-squared	0.123623
Log-likelihood	-886.8271	Akaike criterion	1801.654
Schwarz criterion	1876.123	Hannan-Quinn	1829.388
Likelihood ratio test: Chi-square(13) = 282.143 [0.0000]			

Adjusted Confusion Matrix and Accuracy Ratio (R_P^2):

		Predicted		
		[0]	[1]	Total
Actual	[0]	603	268	871
	[1]	228	410	638
	Total	831	678	1509

Accuracy ratio = 67.13%

Source: own analysis.

Table 3. Model 2—Logit regression results for the rural boroughs with the 'strong' under pressure profile

n = 1512; omitted incomplete observations: 47; Dependent variable (Y): UnderPress_Strong

	Coefficient	*Stand. error*	*z*	*p-value*	*Marginal effects*
const	15.7561	1.53936	10.2355	<0.00001***	
apartments_pc	-0.555896	0.107732	-5.1600	<0.00001***	-0.0110215
kind_garten	-0.0149214	0.00749755	-1.9902	0.04657**	-0.000295839
firms_pc	-0.0305667	0.00785923	-3.8893	0.00010***	-0.000606032
sewer	-0.0130014	0.00459712	-2.8282	0.00468***	-0.000257773
pop_pre_prod	-0.941458	0.0766772	-12.2782	<0.00001***	-0.0186658
dist_Province	0.00869848	0.00449804	1.9338	0.05313*	0.000172461
dist_TWCR	0.0171228	0.00708635	2.4163	0.01568**	0.000339486
Exp_pc	0.377288	0.109848	3.4346	0.00059***	0.00748031
Debt_Revenue	0.0119924	0.00554486	2.1628	0.03056**	0.000237768
HealthBasic	0.203611	0.048244	4.2204	0.00002***	0.00403689
SocialAid	0.0499838	0.0218244	2.2903	0.02201**	0.000991006
tourist	-0.760829	0.292009	-2.6055	0.00917***	-0.0150846

Mean dependent var	0.166667	S.D. dependent var	0.372801
McFadden R-squared	0.486733	Adjusted R-squared	0.467650
Log-likelihood	-349.6625	Akaike criterion	725.3249
Schwarz criterion	794.5004	Hannan-Quinn	751.0850

Likelihood ratio test: Chi-square(12) = 663.172 [0.0000]

Adjusted Confusion Matrix and Accuracy Ratio (R_P^2):

		Predicted		
		[0]	[1]	Total
Actual	[0]	1047	213	1260
	[1]	36	216	252
	Total	1083	429	1512

Accuracy ratio = 83.53%

Source: own analysis.

TABLE 4. Model 3—Logit regression results for the rural boroughs with the 'moderate' under pressure profile
n = 1512; omitted incomplete observations: 47; Dependent variable (Y): UnderPress_Moderate

	Coefficient	*Stand. error*	*z*	*p-value*	*Marginal effects*
const	16.2827	1.31272	12.4038	<0.00001***	
pupils_per_school	0.0741419	0.0290632	2.5511	0.01074**	0.00684027
apartments_pc	-0.520423	0.0818337	-6.3595	<0.00001***	-0.0480138
kind_garten	-0.0126319	0.00593389	-2.1288	0.03327**	-0.00116541
firms_pc	-0.0264506	0.00572432	-4.6207	<0.00001***	-0.00244031
sewer	-0.0179283	0.00358507	-5.0008	<0.00001***	-0.00165406
pop_pre_prod	-0.949899	0.0645987	-14.7046	<0.00001***	-0.0876369
dist_Province	0.0119157	0.00362477	3.2873	0.00101***	0.00109933
Rev_pc	-0.451288	0.231954	-1.9456	0.05170*	-0.0416355
Exp_pc	0.99543	0.331731	3.0007	0.00269***	0.0918376
HealthBasic	0.114928	0.0423512	2.7137	0.00665***	0.0106031
SocialAid	0.0626352	0.0186191	3.3640	0.00077***	0.00577868

Mean dependent var	0.298280	S.D. dependent var	0.457655
McFadden R-squared	0.468872	Adjusted R-squared	0.455848
Log-likelihood	-489.3887	Akaike criterion	1002.777
Schwarz criterion	1066.632	Hannan-Quinn	1026.556

Likelihood ratio test: Chi-square(15) = 873.807 [0.0000]

Adjusted Confusion Matrix and Accuracy Ratio (R_p^2):

		Predicted		
		[0]	[1]	Total
Actual	[0]	873	188	1061
	[1]	65	386	451
	Total	938	574	1512

Accuracy ratio = 83.27%

SOURCE: own analysis.

Table 5. Summary of the impact of significant variables on the rural borough profile

Model 1 (FreeRider)		Model 2 (UnderPress_Strong)		Model 3 (UnderPress_Moderate)	
		Location			
Y (dependent variable)	Adjacent to Province Capital (<50 km)	dist_Province	+	dist_Province	+
		dist_MNPP	+		
		tourist	-		
		Demographics			
pop_dynamic	+	Y (dependent variable)	Strong decline (-3%)	Y (dependent variable)	Decline (-2%)
pop_post_prod		Y (dependent variable)	Very negative (over 22%)	Y (dependent variable)	Negative (over 21%)
pop_pre_prod	-	pop_pre_prod	-	pop_pre_prod	-
pupils_in_popul	+				
		Business and Labor			
firms_pc	+	firms_pc	-	firms_pc	-
salary	+				
		Social and Infrastructure			
kind_garten	+	kind_garten	-	kind_garten	-
HealthBasic	+	HealthBasic	+	HealthBasic	+
		SocialAid	+	SocialAid	+
water_	+	sewer_	-	sewer_	-
apartm_LTchg_pc	+	apartments_pc	-	apartments_pc	-
pupils_per_school	+			pupils_per_school	+
		LG Financials			
Rev_pc	-	Debt_Revenue	+	Rev_pc	-
		Exp_pc	+	Exp_pc	+
		Environmental			
forest	-				
water_usg	-				

Source: own analysis.

References

Adamowicz, Mieczysław and Agnieszka Smarzewska. 2009. "Model and Indicators of Sustainable Development in Rural Areas from the Local Perspective." *European policies, Finance and Marketing,* SGGW, 1(50): 251-268.

Aiello, Francesco and Valeria Pupo. 2012. "Structural Funds and the Economic Divide in Italy." *Journal of Policy Modeling* 34(3): 403–418.

Boldrin, Michele and Fabio Canova. 2001. "Inequality and Convergence in Europe's Regions: Reconsidering European Regional Policies." *Economic Policy* 32: 205–253.

Borys, Tadeusz. 2008. "Zaprojektowanie i przetestowanie ram metodologicznych oraz procedury samooceny gmin na podstawie wskaźników zrównoważonego rozwoju w Systemie Analiz Samorządowych." Jelenia Góra, Związek Miast Polskich.

Bouayad-Agha, Salima, Nadine Turpinn and Lionel Védrine. 2011. "Fostering the Development of European Regions: A Spatial Dynamic Panel Data Analysis of the Impact of Cohesion Policy." *Regional Studies* 47: 1573–1593.

Dall'Erba, Sandy and Fang Fang. 2017. "Meta-analysis of the Impact of European Union Structural Funds on Regional Growth." *Regional Studies* 51(6): 822-832.

da Silva, Diego Firmino Costa, J. Paul Elhorst and Raul da Mota Silveira Neto. 2017. "Urban and Rural Population Growth in a Spatial Panel of Municipalities." *Regional Studies* 51(6): 894-908.

Dijkstra, Lewis, Enrique Garcilazo and Philip McCann. 2015. "The Effects of the Global Financial Crisis on European Regions and Cities." *Journal of Economic Geography* 15: 935–949.

Fratesi, Ugo and Fiona Wishlade. 2017. "The Impact of European Cohesion Policy in Different Contexts." *Regional Studies* 51(6): 817-821.

Gagliardi, Luisa and Marco Percoco. 2017. "The Impact of European Cohesion Policy in Urban and Rural Regions." *Regional Studies* 51(6): 857-868.

Gennaioli, Nicola, Rafael La Porta, Florencio Lopez de Silanes and Andrei Shleifer. 2014. "Growth in Regions." *Journal of Economic Growth* 19(3): 259–309.

Greene, William. 2000. *Econometric Analysis.* 4th ed., New Jersey: Prentice Hall International.

Kluza, Krzysztof. 2016. "Sustainability of Local Government Sector Debt. Evidence from Monte-Carlo Simulations." *Lex Localis - Journal of Local Self-Government*. 14(1): 115 – 132.

Kluza, Krzysztof. 2017. "Risk Assessment of the Local Government Sector Based on the Ratio Analysis and the DEA Method. Evidence from Poland." *Eurasian Economic Review*: 1-23. https://doi.org/10.1007/s40822-017-0075-z.

Krugman, Paul and Anthony Venables. 1995. "Globalization and the Inequality of Nations." *Quarterly Journal of Economics* 110: 857–880.

McCann, Philip. 2013. *Modern Urban and Regional Economics*. 2nd ed., Oxford: Oxford University Press.

OECD. 2009. "How Regions Grow." *OECD Observer*, Paris: 1-7.

OECD. 2016. *A New Rural Development Paradigm for the 21st Century: A Toolkit for Developing Countries*. Paris: Development Centre Studies, OECD Publishing.

Pavlíková, Gabriela. 2009. "Regional Policies and Rural Development in the Czech Republic in the Context of the European Integration." *European policies, Finance and Marketing* SGGW 1(50): 73-87.

Puigcerver-Peñalver, Mari. 2007. "The Impact of Structural Funds Policy on European Regions' Growth: A Theoretical and Empirical Approach." *European Journal of Comparative Economics* 4: 179–208.

Sheppard, Eric. 2017. "Economic Theory and Underdeveloped Regions." *Regional Studies* 51(6): 972-973.
UN. 1987. *Report of the World Commission on Environment and Development: Our Common Future*. New York: United Nations, Oxford University Press.
UN. 2007. *Indicators of Sustainable Development: Guidelines and Methodologies*. third ed., New York: United Nations.
UN. 2015. *World Urbanization Prospects: The 2014 Revision*. New York: United Nations.
Verbeek, Marno. 2002. *A Guide to Modern Econometrics.* Chichester: John Wiley & Sons.

Abstract

Rural Areas—Boroughs under Pressure and Free Riders.
Evidence from Poland

The analysis of rural areas in Poland on the LAU2 level reveals significant heterogeneities among these entities. Research based on demographic, wellbeing and infrastructure indicators showed that there was no uniform pattern of change in the rural areas. Two main groups emerged from the analysis—systematically depopulated and financially stressed peripheral boroughs and rural boroughs adjacent to large municipalities, which undertook skillful free rider strategies. The latter limited their own provision of public goods such as healthcare and education on the one hand and, on the other, attracted residents and businesses from the municipalities. Such a strong differentiation between rural boroughs indicates the need for a reconsideration of the criteria for regional cohesion policies to design context-dependent regional policy instruments instead of the currently prevailing approach of 'one size fits all' allocation policies.

Keywords

convergence process, local governments, regional growth, rural development