Agnieszka Małkowska[*], *Michał Głuszak*[**]
Cracow University of Economics, Poland

Pro-investment Local Policies in the Area of Real Estate Economics – Similarities and Differences in the Strategies Used by Communes

Abstract: *In the article we discuss the importance of the real estate related instruments used by local government to attract investment and stimulate local economic development. The article discusses economic literature related to public economics at the local government level, with the special emphasis put on the link between urban and real estate economics and development. In the empirical part of the paper, we analyze the results of the survey conducted at the local government level in Poland (Malopolska). There are two major research objectives: (1) to*

---

identify the scope of the real estate economic instruments used by the communes as part of their development policies' strategies; (2) to examine the coexistence of certain types of instruments as part of the commune development strategies.

To find relevant answers, both multidimensional scaling and cluster analysis are applied. Additionally, we discuss whether there are evidence of mimicking behavior in local development policies.

Introduction

Since 1990s Polish communes have become an interesting object of economic research, but some of the valid questions still remain unanswered. Decentralisation of the public authority in Poland, directly linked with political changes initiated after 1989, resulted in creating, in its first phase, two levels of public administration, that is the central and the local (commune) levels. Further reforms undertaken a few years later introduced additional self-government levels: districts and voivodeships. Communes, constituting the smallest areas, were acknowledged to be the basic units of the local government in Poland. They were entrusted with vast competences and tasks in order to meet the local societies' needs. In the light of contemporary theoretical views on the role of public authorities in social-economic life, as well as views on the local development concepts which have been dynamically developing since the 1960's, local government authorities started to be perceived as bodies responsible for undertaking active measures in order to develop local areas. Polish literature (making use of foreign literature achievements) widely discusses the real impact of the commune bodies upon development processes, the commune bodies' activity forms as well as the efficiency of available local interventionism tools. Regardless of these results and the ongoing discussion, a strong responsibility of communes authorities was felt in terms of a proper conduct of the local economic policy and taking efforts to stimulate the development processes.

The aim of this paper is to assess the role of the real estate related instruments used by local government, in order to attract investment and stimulate local economic development. Research interests were threefold:

1) to identify the scope of the real estate economic instruments used by the communes as part of their development policies' strategies;
2) to examine the coexistence of certain types of instruments as part of the commune development strategies;
3) to determine if there is spatial autocorrelation between communes entities as a result of mimicking behavior in local development policies.

Empirical part is based on the data collected from the communes located in the South of Poland, in the Malopolska voivodeship.

Previous Research

One of the key issues in the economic literature on local economic policy is the role of the public sector in creation of a favorable investment climate and promotion of local and regional economic development. There are many theoretical and empirical items of literature in this area (Bagdziński, 1994; Blair, 1995; Brol, 1998; Jewtuchowicz, 2005; Blakely & Leigh, 2010; Korenik & Dybała, 2010). There is still, however, a debate about the real impact of local economic policies on the creating a favorable business climate. In the theory, better competitiveness in local areas may attract the private capital and as the result improve the welfare. In many empirical studies, the relationship between economic development policies and their effects was discussed and measured (Fisher, 1997, pp. 53-82; Sztando, 1999, pp. 79-108; Domański & Jarczewski (Eds.), 2006, p. 100;). Some authors are convinced of a lack or only small positive impact of economic policy on the economic growth, and even argued that the negative effects of such policy are underestimated (Rubin & Rubin, 1987, pp. 37-62; Ross 1996, pp. 354-380; Piasecki (Ed.), 2007, p. 288). Others believe that economic policy is the important factor in supporting economic development (Fox & Murray, 1990, pp. 413-427; Blume, 2006, pp. 321-333). Since Tiebout (1956) significant evidence is based on the literature on the effects of fiscal instruments such as taxes, subsidies and public expenditures on economic growth and welfare (Helms, 1985, pp. 574-582; Baum, 1987, pp. 348-360; Bartik, 1992, pp. 102-110; Caplan, 2001, pp. 101–122). An important focus of research in this area is the issue of tax competition. Local governments shaping local tax rates are trying to influence the investment locations of taxpayers. This action is two-pronged – on the one hand, the local authorities determine the level of the fiscal burden, on the other hand, the generated tax revenues determine the level of public services (Głuszak & Marona., p. 256). In this way, there is a competition between neighboring public entities, and it is debatable whether this competition is effective (Wilson, 1999, pp. 269-304; Caplan, 2001, pp. 101-122). Research on the local tax policy effects is often combined with the phenomenon of tax mimicking (Revelli, 2002, pp. 1723-1731; Allers & Elhorst, 2005, pp. 493-513; Santolini, 2008, pp. 431-451; Delgado & Mayor, 2010, pp. 149-164), which indicates spatial interaction among local governments in tax setting. Empirical studies identified the impact of local tax policy on the decisions in tax

policy in the neighboring entities. In the theory there are three explanations for tax mimicking (Allers & Elhorst, 2005, pp. 493-513):

− expenditure "spillovers" or "externalities" model,
− tax competition based on Tiebout model (mentioned before),
− political agency – yardstick competition model.

On the other hand, the imitation behavior is rarely examined as regards the references to other instruments of economic development (Małkowska & Telega, 2012, pp. 175-183).

One of the most important factors of economic development are public direct investment, which create the conditions for private investment initiatives (Węgrzyn, 2012, pp. 247-258; Nalepka & Węgrzyn, 2005, pp. 89-99). The importance of public investment is especially noticeable in Poland, where the infrastructure gap is a significant barrier to economic development.

Interesting approach to research is presented by the authors studying the impact of public services on economic development. In many such studies public services are estimated as statistically significant and positive for economic development process (Luce, 1994, pp. 139-67; Dalenberg & Partridge, 1995, pp. 617-640; Papke, 1991, pp. 47-68). Fisher (1997, pp. 53-82) comparing known results in this area notes that the "results of studies vary greatly and it can be concluded that some public services have a positive effect on some measures of economic development in some cases". Therefore, in order to take into account the specific nature of the area and the factors determining the effectiveness of economic development policy, some researchers use the case studies instead of or in addition to the econometric analysis.

One of the areas used by public authorities in order to, among others, stimulate the process of local economic development, is the real estate economy. The notion of the "real estate economy" is, from a practical point of view, reduced to managing commune real estates. A wide approach to "real estate economy" of the local governments can be defined as conscious and purposeful actions of the authorized self-governing subjects, in accordance with the law. It encompasses making decisions and undertaking factual and legal acts related to the real estate's located within the local area and aiming at specific targets which are subject to economic development policy run by the local authorities (Cymerman, 2009, pp. 29-46). It is, in other words, a total amount of actions undertaken by the local governments and related to real estate stock in a given commune. Public real estate economy run by local governments is increasingly frequently described in the context of instruments which those governments use. There are two interesting issues:

− the problem of tools selection by the local authorities and the co-occurrence of such instruments of the groups within the local development strategies,
− mimicking the nature of politics in neighboring communities.

It is worth mentioning that only few papers have investigated the influence of the instruments from the area of real estate economics on the economic development – with the exception of tax incentives and public services related to technical infrastructure (Smith, 2009, pp. 209-234). In reverse, there are not many pieces of research on the impact of economic development policies on the local real estate market. D'Arcy and Keogh (1998) argued that the new research on territorial competitiveness should be supplemented by the role of real property and property market. So far, however, Polish literature lacks systematic studies on the real estate economy instruments, their choice, implementation or effects.

Research Methodology

The paper presents empirical study aimed to identify different strategies in the selection of the available tools by the local governments, to assess the coexistence of chosen tools and to verify the thesis about the occurrence of imitation effect in the policy pursued by the local authorities.

The data basis of the analysis is the results of a survey conducted in the 2009. The sample in the survey was communes' authorities of the Małopolska voivodeship. The general object of the study was to determine the relationships between local government policy on the field of real estate economics and the level of local economic development. The required information was gathered through a questionnaire sent to all the communes of the province via postal mail and e-mail. Questionnaire, due to the deliberately simplified form, allowed the measurement of the majority of the variables tested according to nominal and ordinal scale. The survey form was completed by 92 commune offices, giving slightly more than 50% response rate. The share of the various types of communes (urban, rural and urban-rural) in the research sample corresponds to the overall structure of the voivodeship. The results presented below are based on the analysis of one of more important questions raised for local self-governments in the organized survey. This question referred to utilization of the enumerated instruments of real estate economy by the local authorities within the last ten years.

The potential instruments of real estate economy listed in the survey were as follows (Table 1)

Table 1. Real estate related instruments analyzed in the study

Variable	Description	Percent
X_1	preparation of location offers for investors	72,8
X_2	local authority support for an investor in the process of granting construction permit	68,5
X_3	local authority support for an investor in the process of negotiation with the owners of real estate to get land for investments	62,0
X_4	preparation of land for investments by means of conversion – reclassification, combining and dividing	73,9
X_5	adopting plans of spatial development which are actual and convenient for investors	89,1
X_6	application of lower property tax rates that statutory rates	67,4
X_7	differentiation of property tax rates due to the character of business, location of the real property and type of construction	35,9
X_8	using property tax reliefs and tax exemptions in relation to the character of business or investment activity	45,7
X_9	development of infrastructure in the investment area for private entities	53,3
X_{10}	investing into development and appropriate maintenance of local road connections	93,5
X_{11}	purchasing land by the commune from private owners in order to prepare and provide the land to investors	84,8
X_{12}	temporary provision of buildings and commune premises on a lease/rental basis to conduct business activities	28,3
X_{13}	application of preferential rental rates for public real property in order to conduct business activities	43,5

Source: authors' own calculation.

Information obtained from communes showed, which of above tools were applied and which were not. The research is exploratory. We analyze the survey data using multidimensional scaling (MDS) and cluster analysis (CA).

Exploratory analysis

To examine the coexistence of instruments used by communes to promote local development we analyzed survey response patterns. In the dataset 13 dichotomous variables represented real estate economy instruments potentially used (1) or not used (0) by communes. To assess similarities in response patterns we used Jaccard Index – a measure of similarity suggested by Sneath (1957). The Jaccard Index (J) for two dichotomous (0-1) variables X and Y is given by:

$$J = \frac{a}{a + b + c}$$

where:

a – number of cases where both X and Y have a value of 1.

b – number of cases where X has a value 1, while Y has value 0.

c – number of cases where X has a value 0, while Y has value 1.

There are other measures of similarity between dichotomous responses – for example indices proposed by Dice (1945) or Rao (1948), but according to Finch (2005) the results of cluster analysis do not depend significantly of the index used to describe dis(similarity).

When analyzing data in Table 2, it seems obvious that some real estate instruments are often used together (for example X5 and X10, J=0,91) whereas other are not (for example X5 and X12, J=0,32). In order to facilitate the interpretation of the results, proximities were analyzed further with the use of multidimensional scaling.

Multidimensional Scaling (MDS) is not a separate statistical method, but rather a group of techniques used to produce maps, which can facilitate the description of multivariate phenomena found in the data. In the research we used MDS (ALSCAL algorithm) to explore relations between real estate based instruments used to promote local development. Jaccard distance was used to show (dis)similarity of instruments. Again, we assumed that the most similar instruments are those that are used together by communes in the sample. Results are presented on a exhibit (Figure 1). The closer the points on the map the more related the respective instruments are.

Based on the results of multidimensional scaling (visualized on the Fig. 1) we have differentiated several groups of instruments:

– supply side instruments: instruments connected to zoning, conversions, planning and land development. They create new supply (X1, X4, X5, X10, X11)

– demand side instruments: incentives, direct and indirect financial support for new or existing investment. They aim to attract new investors (X6, X8, X9, X13).

– procedural instruments: the instruments from this group are connected to guidance and procedural business support for investors willing to start new operations (X2, X3)

Table 1. Jaccard Similarity Index for real estate economy instruments used by sample communes

|	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13
X1	1,00												
X2	0,71	1,00											
X3	0,65	0,71	1,00										
X4	0,73	0,68	0,67	1,00									
X5	0,73	0,71	0,62	0,79	1,00								
X6	0,61	0,58	0,57	0,67	0,67	1,00							
X7	0,33	0,39	0,34	0,40	0,40	0,46	1,00						
X8	0,49	0,46	0,46	0,45	0,48	0,53	0,44	1,00					
X9	0,49	0,53	0,41	0,56	0,60	0,52	0,49	0,42	1,00				
X10	0,72	0,69	0,63	0,75	0,91	0,68	0,38	0,49	0,57	1,00			
X11	0,69	0,64	0,61	0,70	0,82	0,69	0,35	0,45	0,49	0,86	1,00		
X12	0,31	0,35	0,34	0,32	0,32	0,31	0,31	0,33	0,39	0,30	0,30	1,00	
X13	0,47	0,45	0,49	0,50	0,45	0,46	0,43	0,49	0,41	0,45	0,48	0,29	1,00

Source: authors' own calculation.

Two instruments were distinct from the others:
– temporary provision of buildings and commune premises on a lease/rental basis to conduct business activities (X12)
– differentiation of property tax rates due to the character of business, location of the real property and type of construction (X7)

The latter two instruments are usually not used as a part of real estate strategy – they are rarely used compared with other tools. These can be referred as to occasional instruments.

Figure 1. Derived Stimulus Configuration (Euclidean distance model)
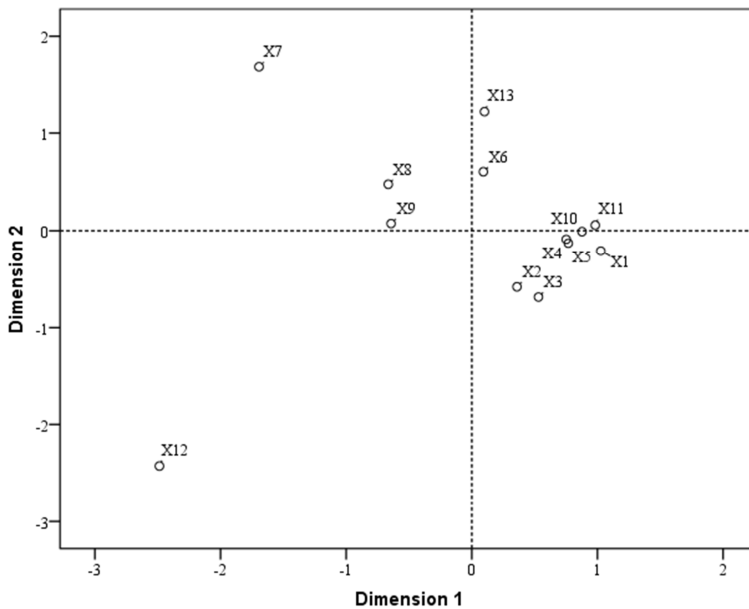
X1– preparation of location offers for investors; X2– local authority support for an investor in the process of granting construction permit; X3 – local authority support for an investor in the process of negotiation with the owners of real estate to get land for investments; X4 – preparation of land for investments by means of conversion – reclassification, combining and dividing; X5– adopting plans of spatial development which are actual and convenient for investors; X6– application of lower property tax rates that statutory rates; X7– differentiation of property tax rates due to the character of business, location of the real property and type of construction; X8 – using property tax reliefs and tax exemptions in relation to the character of business or investment activity; X9 – development of infrastructure in the investment area for private entities; X10 – investing into development and appropriate maintenance of local road connections; X11 – purchasing land by the commune from private owners in order to prepare and provide the land to investors; X12 – temporary provision of buildings and commune premises on a lease/rental basis to conduct business activities; X13 – application of preferential rental rates for public real property in order to conduct business activities.
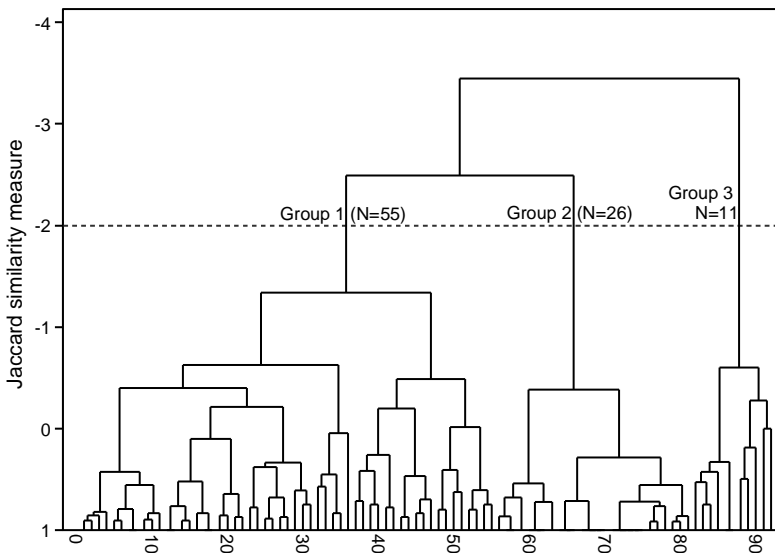
Source: authors' own work.

Cluster Analysis Results

Another interesting research topic is connected to strategies used by communes while using real estate economy instruments. It is interesting to see whether there are groups of communes that use the same set of tools to promote local development. These could imply other interesting question – is there mimicking effect when it comes to applying real estate based instruments by local government. In order to find relevant answers, we start from cluster analysis.

To group communes in the sample based on real estate economy instruments used in practice, we used hierarchical cluster analysis. We applied Ward method of clustering described by Ward (1963), which is probably the most frequently used clustering method.

Figure 2. Dendrogram for cluster analysis of sample communes based on real estate economy instruments used

Source: authors' own work.

Based on the agglomeration schedule (dendrogram) we conclude that there are three basic groups of communes, clustering 55 (group1), 26 (group2, and 11 (group3) communes respectively. Descriptive statistics

referring to real estate instruments usage (percentage of communes using selected instruments) were presented in the table (Table 3).

Table 2. Real estate economy instruments used by clusters of communes

Variable	Group 1	Group 2	Group 3
X1	74,5%	88,5%	27,3%
X2	72,7%	88,5%	0,0%
X3	61,8%	88,5%	0,0%
X4	78,2%	96,2%	0,0%
X5	94,5%	96,2%	45,5%
X6	61,8%	96,2%	27,3%
X7	20,0%	84,6%	0,0%
X8	34,5%	84,6%	9,1%
X9	56,4%	69,2%	0,0%
X10	96,4%	100,0%	63,6%
X11	81,8%	96,2%	72,7%
X12	29,1%	38,5%	0,0%
X13	23,6%	100,0%	9,1%

Source: authors' own work.

Based on the results of cluster analysis we have identified three groups of communes. While communes within each group differed to some extent – it was hard to find two communes who used exactly the same set of instruments – they were relatively homogenous. The clusters were:
– Group 1 (Selective): Communes within this cluster utilized several instruments of real estate economy. On the other hand, members of this cluster did not in general use property taxation incentives (lower property tax rates, differentiation of property tax rates), as well as rental tools (temporary provision of buildings for lease, or lower rental rates for public real property).
– Group 2 (Unitary): Members of this cluster were using most of real estate economics instruments. The only exemption was temporary provision of buildings and commune premises (utilized by only 38,5% communes), but this particular tool was rarely used in general.
– Group 3 (Passive): Cluster members were relatively inactive in terms of real economy instruments used to promote local development. Any of

these communes declared support for investors. They did not provide infrastructure in selected areas in order to attract investors.

The last interesting question is related to geographical distribution of the clusters found. One interesting example would be nonrandom spatial distribution of the communes representing three types (groups) found in the cluster analysis. The latter case could indicate some kind of mimicking behavior. The results of the cluster analysis were plotted on the map, but the effect was inconclusive. As we only got approximately 50% response rate, there were substantial blank spots (missing observations), which makes analyzing spatial distribution pattern challenging. Another problem is connected to the fact that we only have static data, and could not observe the dynamics of the mimicking process (adoption of certain tools by other communes). It is an interesting question for future research.

Conclusions

In the article we discussed the issue of the real estate related instruments typically used by Polish communes to attract investment and stimulate local economic development. We have analyzed the results of the survey conducted at the local government level in Poland (Malopolska) using multi-dimensional scaling and cluster analysis.

We have found that direct measured like investing into local road network are the most frequently used instrument to promote local development. On the other hand, differentiation of property tax rates, and temporary provision of public buildings to investors are rarely used. In general, three major categories of instruments were identified: demand, supply and procedural. Based on the array of real estate instruments used to promote local development, we grouped communes in the sample, using Ward's clustering method, into three clusters – selective (dominant), unitary and passive.

Finally, we discussed the mimicking behavior in local public policies both on theoretical and empirical level. However, we were not able to find conclusive answers on empirical bases, due to significant non-response rate in the survey in Malopolska. We conclude that more panel data research is needed, to find links between urban and real estate public policy and local government.

References

Allers, M., & Elhorst, J. P. (2005). Tax Mimicking and Yardstick Competition Among Local Governments in the Netherlands. *International Tax and Public Finance*, 12(4). DOI: http://dx.doi.org/10.1007/s10797-005-1500-x.

Bagdziński, S. L. (1994). *Lokalna polityka gospodarcza (w okresie transformacji systemowej)*. Toruń: Wydawnictwo Uniwersytetu Mikołaja Kopernika.

Bartik, T. J. (1992). The Effects of State and Local Taxes on Economic Development: A Review of Recent Research. *Economic Development Quarterly*, 6. DOI: http://dx.doi.org/10.1177/089124249200600110.

Baum, D. N. (1987). The Economic Effects of State and Local Business Incentives. *Land Economics*, 63. DOI: http://dx.doi.org/10.2307/3146292.

Blair, J. P. (1995). *Local Economic Development. Analysis and Practice*. California: Sage Publications.

Blakely, E. J., & Leigh, N. G. (2010). *Planning Local Economic Development. Theory And Practice*. Fourth Edition. California: Sage Publications.

Blume, L. (2006). Local Economic Policies as Determinants of Local Business Climate: Empirical Results from a Cross-section Analysis among East German Municipalities. *Regional Studies*, 40 (4). DOI: http://dx.doi.org/10.1080/00343400600725178.

Brol, R. R. (Ed.) (1998). *Zarządzanie rozwojem lokalnym. Studium przypadków*. Wrocław: Wydawnictwo Akademii Ekonomicznej we Wrocławiu.

Caplan, B. (2001). Standing Tiebout on His Head: Tax Capitalization and the Monopoly Power of Local Governments. *Public Choice,* 108. DOI: http://dx.doi.org/10.1023/A:1017564623294.

Cymerman, J. (2009). Aktywna gospodarka nieruchomościami a dochody gmin. *Studia i Materiały Towarzystwa Naukowego*, 17(3).

D' Arcy, E. & Keogh, G. (1998). Territorial Competition and Property Market Process: An Exploratory Analysis. *Urban Studies*, 35(8). DOI: http://dx.doi.org/10.1080/0042098984330.

Dalenberg, D. R., & Partridge, M. D. (1995). The Effects of Taxes, Expenditures, and Public Infrastructure on Metropolitan Area Employment. *Journal of Regional Science*, 35(4). DOI: http://dx.doi.org/10.1111/j.1467-9787.1995.tb01296.x.

Delgado, F. J., & Mayor, M. (2010). Tax Mimicking Among Local Governments: Some Evidence from Spanish Municipalities. *Portuguese Economic Journal*, 10. DOI: http://dx.doi.org/10.1007/s10258-010-0067-3.

Dice, L. R. (1945). Measures of the Amount of Ecologic Association Between Species. *Ecology,* 26.

Domański, B., & Jarczewski, W. (Ed.) (2006). *Klimat inwestycyjny w województwie małopolskim*. Kraków: Wydawnictwo Departament Gospodarki i Infrastruktury. Urząd Marszałkowski Województwa Małopolskiego.

Finch, H. (2005). Comparison of Distance Measures in Cluster Analysis with Dichotomous Data. *Journal of Data Scicence*, 3.

Fisher, R. C. (1997). The Effects of State and Local Public Services on Economic Development. *New England Economic Review*, March/April

Fox, W. F., & Murray, M. N. (1990). Local Public Policies and Interregional Business Development. *Southern Economic Journal*, 57. DOI: http://dx.doi.org/10 .2307/1060620.

Głuszak, M. & Marona, B. (2015). *Podatek katastralny. Ekonomiczne uwarunkowania reformy opodatkowania nieruchomości*. Warszawa: Wydawnictwo Poltext.

Helms, L. J. (1985). The Effect of State and Local Taxes on Economic Growth: A Time Series-Cross Section Approach. *Review of Economics and Statistic,* 67(4). DOI: http://dx.doi.org/10.2307/1924801.

Jewtuchowicz, A. (2005). *Terytorium i współczesne dylematy jego rozwoju.* Łódź: Wydawnictwo Uniwersytetu Łódzkiego.

Korenik, S., & Dybała, A. (Eds.) (2010). *Dylematy rozwoju lokalnego i regionalnego na początku XXI wieku*. Wrocław: Wydawnictwo Uniwersytetu Ekonomicznego we Wrocławiu.

Luce, T. F., Jr. (1994). Local Taxes, Public Services, and the Intrametropolitan Location of Firms and Households. *Public Finance Quarterly*, 22(2). DOI: http://dx.doi.org/10.1177/109114219402200201.

Małkowska, A., & Telega, A. (2012). Przestrzenna analiza aktywności planistycznej gmin województwa małopolskiego. *Studia i Materiały Towarzystwa Naukowego Nieruchomości*, 20(1).

Nalepka, A., & Węgrzyn, J. (2015). Rola projektów partnerstwa publiczno – prywatnego w realizacji strategii gminy. *Turystyka i Rozwój Regionalny,* 3.

Papke, L. (1991). Interstate Business Tax Differentials and New Firm Location: Evidence from Panel Data. *Journal of Public Economics*, 45. DOI: http://dx.doi.org/10.1016/0047-2727(91)90047-6.

Piasecki, R. (Ed.) (2007). *Ekonomia rozwoju*. Warszawa: PWE.

Revelli, F. (2002). Testing the Tax Mimicking versus Expenditure Spill-over Hypotheses Using English Data. *Applied Economics*, 14. DOI: http://dx.doi.org/10.1080/00036840210122353.

Rao, C. R. (1948). The Utilization of Multiple Measurements in Problems of Biological Classification. *Journal of the Royal Statistical Society*, Series B10.

Ross, S. L. (1996). The Long-run Effect of Economic Development Policy on Resident Welfare in a Perfectly Competitive Urban Economy. *Journal of Urban Economics*, 40. DOI: http://dx.doi.org/10.1006/juec.1996.0037.

Rubin, I. S., & Rubin, H. J. (1987). Economic Development Incentives: the Poor (cities) Pay More. *Urban Affairs Quarterly*, 23. DOI: http://dx.doi.org/10.1177/004208168702300104.

Santolini, R. (2008). A Spatial Cross-sectional Analysis of Political Trends in Italian Municipalities. *Papers in Regional Science*, 87(3). DOI: http://dx.doi.org/10.1111/j.1435-5957.2008.00201.x.

Smith, B. C. (2009). If You Promise to Build It, Will They Come? The Interaction between Local Economic Development Policy and the Real Estate Market: Evidence from Tax Increment Finance Districts. *Real Estate Economics*, 37(2). DOI: http://dx.doi.org/10.1111/j.1540-6229.2009.00240.x.

Sneath, P. H. A. (1957). Some Thoughts on Bacterial Classification. *Journal of General Microbiology*, 17. DOI: http://dx.doi.org/10.1099/00221287-17-1-184.

Sztando, A. (1999). Gminne instrumenty kształtowania rozwoju lokalnych podmiotów gospodarczych. *Samorząd Terytorialny,* 7-8.

Tiebout, Ch. (1956). A Pure Theory of Local Expenditures. *Journal of Political Economy*, 64(5). DOI: http://dx.doi.org/10.1086/257839.

Ward, J. (1963). Hierarchical Grouping to Optimize an Objective Function. *Journal of the American Statistical Association,* 58. DOI: http://dx.doi.org/10.2307/2282967.

Węgrzyn, J. (2012). Rola władz lokalnych w sferze infrastruktury. *Studia i Materiały Towarzystwa Naukowego Nieruchomości,* 20.

Wilson, J. (1999). Theories of Tax Competition. *National Tax Journal*, 51.