

Malkowska, Agnieszka; Telega, Agnieszka; Gluszak, Michal; Marona, Bartlomiej

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## Property tax autonomy and tax mimicking in major metropolitan areas in Poland

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**Property tax autonomy and tax mimicking in major metropolitan areas in Poland**

**Agnieszka Małkowska, Agnieszka Telega,  
Michał Głuszak, Bartłomiej Marona**

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Agnieszka Małkowska, Agnieszka Telega, Michał Głuszak,  
Bartłomiej Marona  
[malkowska@uek.krakow.pl](mailto:malkowska@uek.krakow.pl);  
Cracow University of Economics, Poland

## Property tax autonomy and tax mimicking in major metropolitan areas in Poland

**JEL Classification:** *H2, H71, R5*

**Keywords:** *tax autonomy; property taxation; tax mimicking; spatial interdependence; Poland*

### Abstract

**Research background:** Real estate and urban economics literature is abundant in studies discussing various types of property taxes and their characteristics. Growing area of research focused on tax equity, tax competition, and tax mimicking. Recently, due to substantial developments in spatial and regional economics more attention was drawn to spatial effects. Empirical results are focused on spatial interaction and diffusion effects, hierarchies of place and spatial spillovers.

Property tax system in Poland differs from those utilized in the majority of developed countries. As a consequence, property tax policy at local government level (including tax competition and tax mimicking effects) in Poland can differ substantially from those found in previous research in US and other European countries. There are few studies addressing the problem of tax competition and tax mimicking in Poland from empirical perspective.

**Purpose of the article:** In the article we explore spatial dependences in property taxation. We identify clustering or dispersion of high and low values of the tax rates within major metropolitan areas in Poland. The effects can indicate presence of tax mimicking among municipalities in given metropolitan areas.

**Methodology/methods:** We analyze the panel data from 304 municipalities in 10 metropolitan areas in Poland from year 2007 to 2016. The data covers four property tax rates: (1) on residential buildings (2) on buildings used for business purpose (3) on land used for business purpose (4) on land for other uses. To explore spatial distribution of rates we used global and local spatial autocorrelation indicators (Moran's I statistic and LISA).

**Findings:** The results suggest the presence of spatial correlation within metropolitan areas. We also found significant differences between metropolitan areas. The results of the study fill the gap in empirical research concerning property tax mimicking in Poland.

## Introduction

Property tax autonomy is closely related to general financial autonomy of municipalities, which may be discussed with regard to the income and/or expenditure aspects. Usually more attention is focused on income issue as a criterion determining financial autonomy of municipalities rather than the local governments' independence in public expenditure. Like in many other countries worldwide, a property tax is the most important public levy in Poland with reference to income autonomy of local governments. It comes from a few circumstances: a property tax is a stable and quite profitable source of local income, municipal authority possesses some ability to shape its own fiscal policy within the limits set by the legislation.

The scope of tax autonomy in Poland is restricted by legal construction of property tax system and contains primarily: setting tax rates up to the level of statutory ones fixed on a yearly basis by central government, differentiation of tax rates, application of tax preferences in the form of exemptions.

It's worth to mention that the property tax system in Poland differs significantly from those utilized in the major of developed countries. In contrary to the framework of property taxation adopted in many other European countries, tax burden in Poland is based on the size of an area of real estate instead of the value. A common feature of both taxation systems – in relation to the area or the property value - is the usage of property tax as an instrument to support local socio-economic development. (Helms, 1985, pp. 574-582; Bartik, 1992, pp. 102-111; Wassmer, 1994, pp. 1251–1278; Buss, 2001, pp. 90-105; Małkowska & Głuszak, 2016, pp. 269-283).

Growing theoretical and empirical literature is focused on different aspects of real estate taxation. One of the current and important issue connected with fiscal autonomy is the strategic interaction among the tax solutions set by neighbouring municipality. Scholars have noticed that policies (e.g. tax policies) adopted by one jurisdiction frequently have economic effects on the others in geographically proximate neighbours. Economic consequences of policy decisions taken by one municipality for its neighbours constitute a strategic game among local governments in which every government competes with those in geographic proximity (Baybeck, Berry & Siegel, 2011, pp. 232-247).

Local governments' decisions in property taxation may have the impact on attracting new capital. Thus, setting tax rates is a sort of economic competition between proximity jurisdictions for mobile factors and residents. Next cause of spatial interactions between public entities may have political background such as electoral accountability, political trends and vote-

seeking (e.g. Besley & Case, 1995, pp. 25-45; Sole-Olle, 2003, pp. 685-713; Santolini, 2008, pp. 431-451). This interactions leads to the situation, that local policymakers consider the tax solutions of neighbouring jurisdictions when setting their own tax rates (Santolini, 2008), what leads to the phenomenon of tax mimicking.

First researches on fiscal policy interdependence were conducted on the base of the data from the United States (e.g. Ladd, 1992, 450-467; Case, 1993, pp. 136-148). Further studies verified the existence of tax mimicking in a few European countries (e.g. Heyndels & Vuchelen, 1998, pp. 89-101; Allers & Elhorst, 2005, pp. 493-513; Santolini, 2008, pp. 431-451, Delgado & Mayor-Fernandez, 2011, pp. 149-164). In Polish literature there are only few papers devoted to tax competition and tax mimicking (e.g. Walasik, 2014, pp. 200-210; Łukomska & Swianiewicz, 2015). However, current research based on Polish data has not explored the problem of spatial interdependency in property tax policy in an exhaustive. In comparison to the other foreign empirical works, there is a significant difference between mechanisms appropriate to ad valorem tax and those based on the area size of real estate. For this reason, empirical studies focused on the other than ad valorem taxation system are notable.

In order to fill the gap in empirical evidence Authors have examined municipalities located in major metropolitan areas in Poland from year 2007 to 2016 in the context of property tax rate settings. We collected the panel data included 304 public entities in 10 metropolitan areas.

The main purpose of this research was to find out whether it is a spatial interdependence in property taxation among neighbouring municipalities within metropolitan areas. For answer this question we have identified clustering or dispersion of high and low values of the tax rates within analysed territories. We established two hypotheses: (1) there is spatial correlation between property tax rates set by municipalities incorporated into metropolitan areas, which can suggest property tax mimicking phenomenon; (2) there are significant differences in spatial patterns of property tax rates values between metropolitan areas.

To indicate this spatial arrangement due to an assumption of policy interdependence we used global and local spatial autocorrelation indicators (Moran's I statistic and LISA).

## **Method of the Research**

In order to verified whether it is a spatial interdependence in property tax rate setting among neighboring municipalities within metropolitan areas in Poland we gathered the panel data from 304 municipalities in 10 metro-

politan areas concentrated around the following central cities in Poland: Bydgoszcz-Toruń (*Bydgoszcz-Torun Metropolitan Area – BTOM*), Gdańsk-Gdynia-Sopot (*Tricity Metropolitan Area – TOM*), Katowice (*Upper Silesia Metropolitan Area – GOM*), Kraków (*Krakow Metropolitan Area – KOM*), Lublin (*Lublin Metropolitan Area – LUBOM*), Łódź (*Lodz Metropolitan Area – LOM*), Poznań (*Poznan Metropolitan Area – POM*), Szczecin (*Szczecin Metropolitan Area – SZOM*), Warszawa (*Warsaw Metropolitan Area – WOM*), Wrocław (*Wroclaw Metropolitan Area – WROM*).

The time range of data covers the period from 2007 to 2016. The substantive scope of gathered information contains four property tax rates: (1) on residential buildings (2) on buildings used for business purpose (3) on land used for business purpose (4) on land for other uses.

Analysis of policy interdependence in tax rate setting between neighboring municipalities was conducted by global and local spatial autocorrelation metrics (Moran's I statistic and LISA).

## **Exploratory analysis**

We investigated the dynamics of major tax rates on land and buildings. To account for autonomy, and to compare different rates we calculated *relative* tax rates. We define *relative* tax rate based on the ratio between actual tax rate set by municipality and maximum allowable tax rate announced by Ministry of Finance in a given year. To analyze the changes in distribution of relative tax rates within metropolitan areas we calculated descriptive statistics. A brief summary of the results is presented in a table (Table 2).

**Table 2.** Relative major tax rates on land and buildings in selected metropolitan areas in Poland from 2007 to 2016

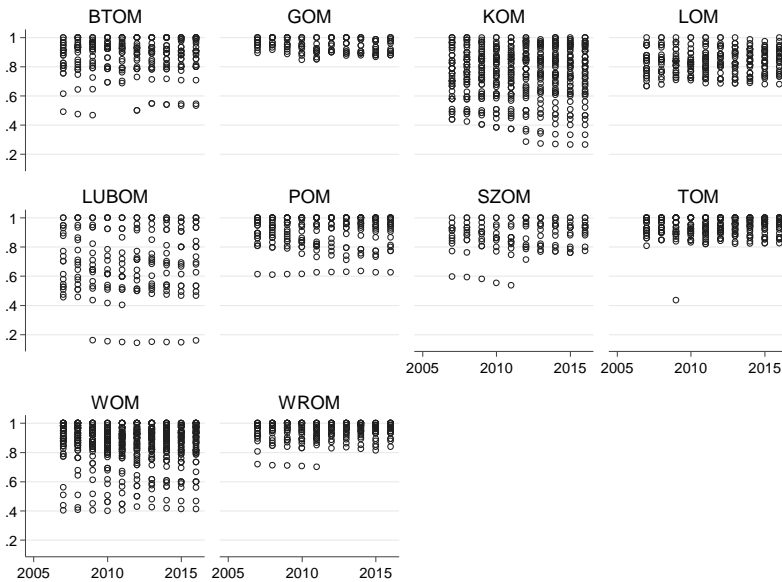
Tax rates / Metropolitan Areas		2007		2010		2013		2016	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
Land used for business purpose	BTOM	0.87	0.10	0.89	0.09	0.88	0.07	0.90	0.08
	GOM	0.96	0.03	0.95	0.03	0.95	0.05	0.95	0.04
	TOM	0.83	0.13	0.84	0.12	0.84	0.12	0.86	0.12
	KOM	0.89	0.08	0.89	0.07	0.89	0.07	0.91	0.07
	LUBOM	0.80	0.14	0.81	0.14	0.82	0.13	0.86	0.13
	LOM	0.93	0.06	0.93	0.07	0.94	0.08	0.95	0.07
	POM	0.90	0.09	0.89	0.10	0.91	0.07	0.94	0.07
	SZOM	0.94	0.05	0.95	0.05	0.95	0.05	0.96	0.04
	WOM	0.92	0.07	0.91	0.07	0.90	0.08	0.91	0.07
WROM	0.95	0.05	0.95	0.06	0.96	0.04	0.98	0.03	
Other land	BTOM	0.46	0.21	0.57	0.23	0.65	0.21	0.68	0.21
	GOM	0.71	0.16	0.81	0.14	0.88	0.13	0.87	0.14
	TOM	0.47	0.24	0.49	0.23	0.55	0.22	0.56	0.24
	KOM	0.53	0.24	0.58	0.22	0.59	0.21	0.61	0.20
	LUBOM	0.56	0.29	0.63	0.27	0.70	0.28	0.73	0.25
	LOM	0.61	0.20	0.69	0.18	0.76	0.20	0.77	0.19
	POM	0.52	0.24	0.65	0.23	0.74	0.17	0.79	0.19
	SZOM	0.68	0.17	0.76	0.16	0.80	0.16	0.85	0.16
	WOM	0.63	0.20	0.68	0.19	0.73	0.19	0.74	0.19
WROM	0.72	0.16	0.79	0.17	0.89	0.13	0.89	0.13	
Buildings used for business purpose	BTOM	0.85	0.07	0.87	0.07	0.88	0.07	0.89	0.07
	GOM	0.97	0.02	0.96	0.03	0.97	0.03	0.98	0.03
	TOM	0.79	0.15	0.81	0.10	0.82	0.10	0.83	0.11
	KOM	0.85	0.08	0.85	0.07	0.85	0.07	0.88	0.07
	LUBOM	0.83	0.08	0.83	0.07	0.83	0.07	0.86	0.07
	LOM	0.89	0.09	0.89	0.09	0.89	0.10	0.91	0.10
	POM	0.90	0.07	0.88	0.08	0.89	0.09	0.92	0.07
	SZOM	0.89	0.08	0.89	0.08	0.90	0.08	0.92	0.08
	WOM	0.92	0.07	0.90	0.07	0.90	0.07	0.91	0.07
WROM	0.96	0.03	0.95	0.05	0.95	0.04	0.97	0.04	
Residential build- ings	BTOM	0.86	0.11	0.90	0.09	0.87	0.12	0.88	0.12
	GOM	0.96	0.03	0.94	0.05	0.95	0.05	0.94	0.05
	TOM	0.75	0.16	0.76	0.16	0.77	0.18	0.77	0.19
	KOM	0.83	0.09	0.83	0.08	0.84	0.09	0.85	0.08
	LUBOM	0.72	0.19	0.70	0.23	0.72	0.23	0.75	0.23
	LOM	0.91	0.09	0.91	0.10	0.92	0.11	0.92	0.10
	POM	0.87	0.10	0.86	0.11	0.90	0.09	0.92	0.07
	SZOM	0.94	0.05	0.94	0.06	0.95	0.05	0.95	0.05
	WOM	0.90	0.12	0.86	0.13	0.87	0.13	0.88	0.13
WROM	0.95	0.06	0.94	0.07	0.96	0.04	0.96	0.04	

Source: own calculations.

The results reveals significant between-group differences in mean tax rates on land and buildings set by municipalities. In case of tax on land for building purpose, relative rates were very high (close to the maximum annual levels set by Ministry of Finance). On average, relative tax rates on land used for business purpose were the highest in Wroclaw Metropolitan Area (WROM), where it reached 96% of maximum rate in 2016 set by

Ministry of Science, and the lowest in Lublin Metropolitan Area (LOM) and Tricity Metropolitan Area (TOM). In latter two it averaged approximately 86% of maximum rate in 2016. On average, lower relative tax rates and significantly larger differences (higher standard deviations) were observed in case of tax rates for other land. In 2016, average relative rates for other land ranged from 56% (TOM) to 89% (WROM). The rates for building were more uniform, with the exception of Lublin Metropolitan Area (LUBOM), where average values were significantly lower than in other metropolitan areas. The dispersion of relative tax rates on buildings in metropolitan areas during the study period is presented in more detail in the figure (Figure 1 and 2).

**Figure 1.** Tax rate on residential buildings from 2007 to 2016 (relative to annual Maximum Rate set by Ministry of Finance, in %)



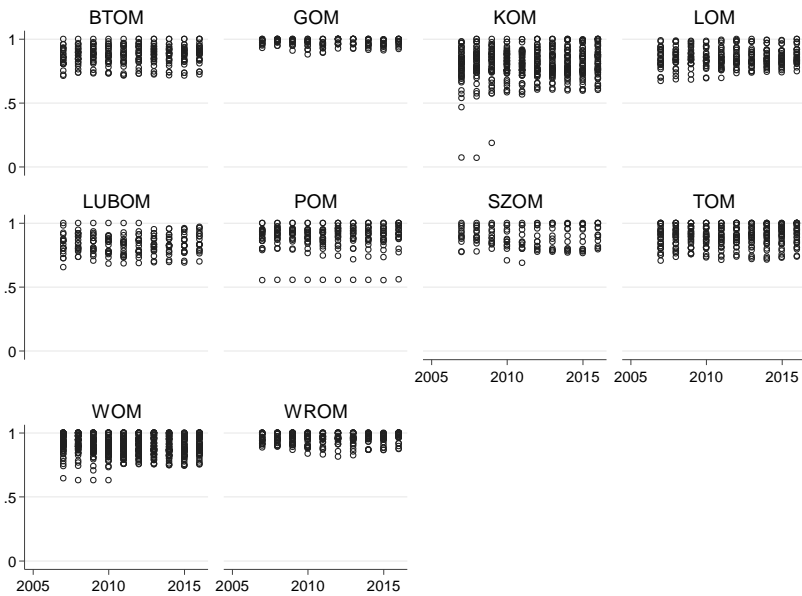
Source: own calculations.

The analysis reveals the presence of outliers, where tax rates differed significantly from typically set in given metropolitan areas. The best examples are Krakow Metropolitan Area (KOM) and Poznan Metropolitan Area (POM). There are considerable differences in variance of the rates – the graph reveals huge disparity in KOM and low dispersion in Upper Silesia



Metropolitan Area (GOM) and WROM – where municipalities applied relatively similar relative tax rates on buildings used for business purpose during the study period.

**Figure 1.** Tax rate on buildings used for business purpose from 2007 to 2016 (relative to Maximum Rate set by Ministry of Finance, in %)



Source: own calculations.

Tax rates on residential buildings were less centered around mean in most metropolitan areas. Huge variation of tax rates was observed within WOM, KOM, and LUBOM. Also in case of tax on residential buildings rates were considerably uniform in GOM.

### Spatial analysis

We examined the spatial autocorrelation for four different real estate tax rates in ten metropolitan areas during ten year period. The adjacency matrix used for calculations had queen criterion of contiguity, which means that a unit (municipality) which share a border or even one corner with another unit is considered as “neighbour”. Spatial computations were performed in

GeoDa (version 1.8.16.4) software (Anselin, 2006). Table 1 presents Moran I spatial autocorrelation measures.

**Table 2.** Moran I statistics, p-value = 0,001

Tax type/Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Tax1	0,252	0,248	0,250	0,228	0,239	0,239	0,240	0,240	0,187	0,215
Tax2	0,072	0,101	0,281	0,031	0,029	0,027	0,267	0,022	0,265	0,059
Tax3	0,299	0,283	0,285	0,290	0,287	0,285	0,278	0,284	0,273	0,272
Tax4	0,374	0,370	0,338	0,340	0,348	0,265	0,329	0,047	0,304	0,295

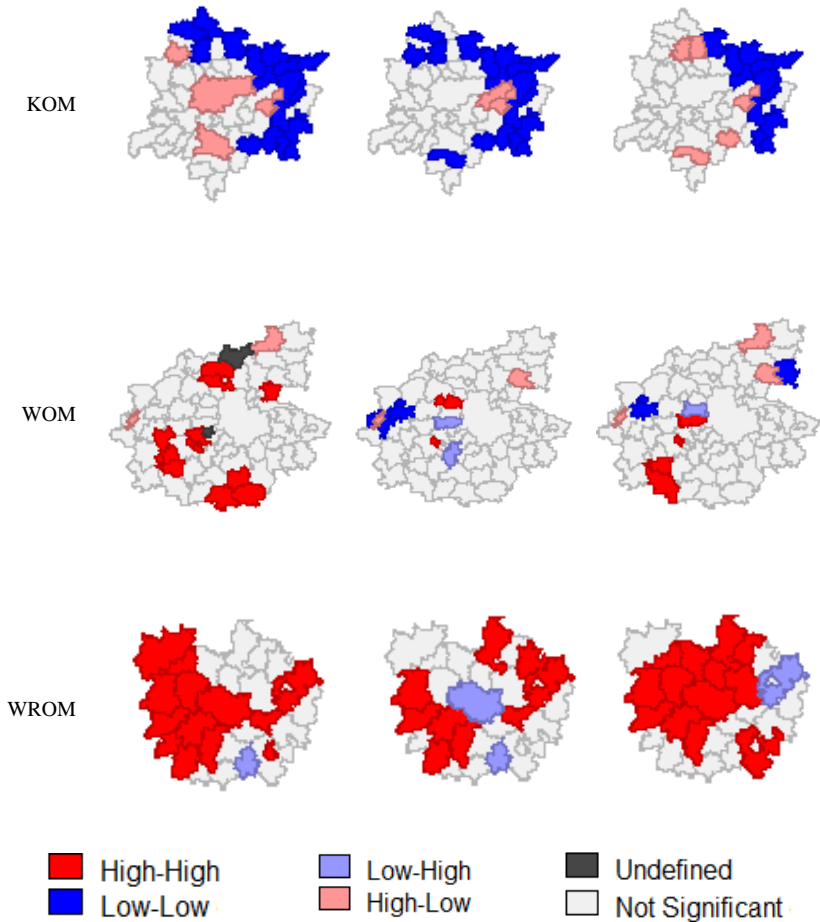
Source: own studies

Results shows that the highest Moran I measure, which indicate the occurrence of low or high value clusters, were calculated for tax 4 (Moran I from 0,29 to 0,37), in turn the lowest Moran I statistics – for tax2 (Moran I from 0,02 to 0,1) and indicates no spatial autocorrelation. Global statistics for all other tax rates (tax1, tax3) were on average about 0,25. Note that despite constant tendencies to clustering, during the analysed period, several exceptions occurred. Tax1 for example, in 2015 had very low Moran I statistic, and for tax2, which didn't indicated any clustering trend, in 2009, 2013 and 2015 global statistic raised to 0,25. Similarly, Moran I statistics for tax4, with strong autocorrelation, in 2014 deflected to 0,047. Certainly, this requires further analysis and political factors should be considered, as an initiator of changes in tax rate policy.

Further analysis consisted of calculating local measures, to test metropolitan areas in terms of which units create “hot” and “cold” clusters. Subsequently we generated LISA cluster map to depict statistical significant locations by the type of association and the results indicate geographical tendencies. Local statistics in three out of ten metropolitan areas were not statistically significant (SZOM, LOM and BTOM) for all tax rates during the analysed time period.

Figure 3 and 4 present the most interesting cases (metropolitan units KOM, WOM and WROM) respectively for tax3 and tax4 over three analysed years (2007, 2011 and 2016). Colours on the map present the following relationships: (1) the dark red locations indicate high tax rates surrounded by high tax rates; (2) the dark blue locations show low tax rates surrounded by low rates. Spatial outlier are marked with lighter colours as followed: (1) light red municipalities are those where are high tax rates surrounded by low; (2) light blue covers locations of high tax rates surrounded by low, (3) light grey depict statistical insignificant areas, and finally (4) dark grey are locations with no data available.

**Figure 3.** LISA Cluster Map of tax rates on residential buildings (tax3)  
 2007                      2011                      2016

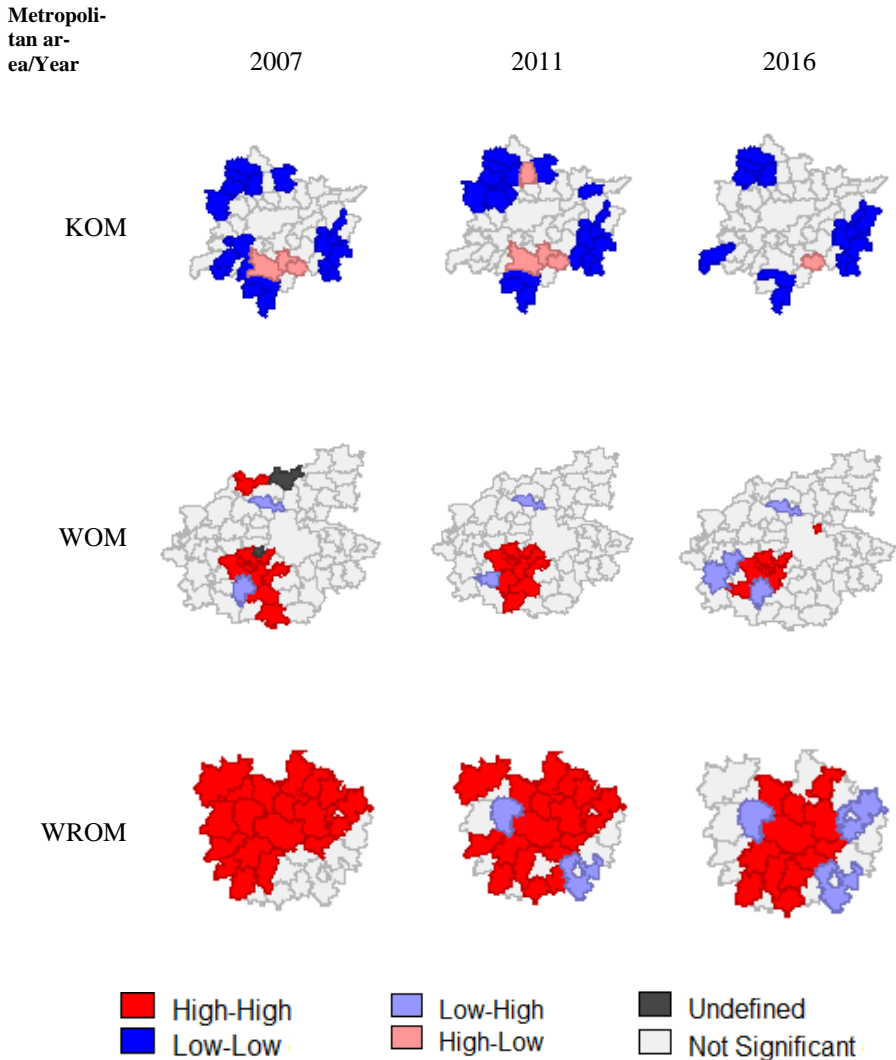


Source: own studies

In case of tax on residential buildings (tax3) and buildings used for business purposes (tax4), similar to tax1, can be seen the tendencies to clustering of high values in western metropolitan areas, whereas cluster of low values were found in eastern areas. In KOM during the following years low values were concentrated in the eastern part of the area, while in the centre appeared “outliers” – units with high values, surrounded by low values. In WOM area basically didn’t stand out any clear trend, but in WROM we observed strong clustering of high tax rates.

Figure 4 presents LISA Cluster Map of tax on building used for business purposes for three metropolitan areas (KOM, WOM, WROM) in 2007, 2011 and 2016.

**Figure 4.** LISA Cluster Map of tax rates on building used for business purposes (tax4)



Source: own studies

Analysis reveals that Moran I statistics calculated for tax4 (tax on buildings used for business purposes) was the highest. LISA statistics indicate

that clusters of high values appears in WROM, TOM and GOM areas, and low value clusters – in KOM and LUBOM and clustering process weakens over time. Local statistic for WOM seems to be an interesting case, because of its randomness, on first sight and slight tendency to clustering in the centre of the area. The Authors suppose, that the reason for that may be connected with an investment activity of municipalities and these are clustered in the centre which are considered to have the greatest economic potential.

## Conclusions

In the paper we investigated the problem of fiscal autonomy of local government, exploring property tax rates used by municipalities in Poland. In the empirical part, analyzed the panel data from 304 municipalities in 10 metropolitan areas in Poland from 2007 to 2016. The results suggests that many municipalities used maximum allowable rates set by Ministry of Finance, thus level of effective autonomy is partially reduced by existing caps. Furthermore, we observed significant differences in property tax policies between metropolitan areas, as well as presence of spatial correlation. We found that municipalities form spatial clusters in relation to tax rates used. This clusters tend to be relatively stable over time. We also identified presence of spatial outliers, municipalities that used different rates than neighbour counterparts. We conclude that this result may indicate property tax mimicking.

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