THE FAIRNESS OF THE CURRENT SYSTEM OF BUILDING LANDS TAXATION IN THE CONTEXT OF MARKET PRICES – CASE OF SLOVAKIA

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Spravodlivosť súčasného systému zdanenia stavebných pozemkov v kontexte trhových cien – prípadová štúdia Slovensko

Abstract: *The current system of land taxation (including building lands) uses a system, where the tax is calculated in relation to the building land prices, which are table prices. The government's intention to tax lands (and building lands) on the basis of its market prices, with the idea that a higher market price means higher value and hence a higher tax is justified; however, today there is no uniform concept that would take account of such a system of taxation based on market real estate prices. The paper presents the latest results of research on the prices of building lands in the Slovakia and their determinants in the context of using these results in confronting the unfairness of the current system of taxation and presents possible proposals for changes to this system on a system linked to market prices of building lands. Using a sample of 960 building lands from the whole of Slovakia and using econometric models and OLS and conditional quantile regression estimation methods, we present basic research results useful in the process of preparing a new real estate taxation system based on the market prices.*

Keywords*: building lands, taxation, market and advertised prices*

JEL Classification: C 51, H 21, H 71

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1 Introduction

The current real estate taxation system is based on a real estate price calculation system, which after multiplying with the tax rate, determines the tax liability of the real estate owner. Real estate prices, however, have been listed in the annex of Act No. 582/2004. [1] These prices do not reflect current market prices, and fairness as one of the key requirements of each tax system is lost. The correct rate of differentiation among taxpayers is to bring a new system of real estate taxation based on their market prices. Real estate taxation based on their market prices requires the approximate market price of real estate, which is not easy at all. For this new system, econometric model, which can easily estimate the price of real estate, are an appropriate opportunity. This paper presents the results obtained within the price determinants of building lands, which can be useful in creating a new taxation system of building lands and being an inspiration for the new concept of real estate taxation.

2 Literature review

In the Slovak Republic, the Act No. 582/2004 distinguishes between the three types of property tax:

- land tax,
- building tax,
- apartment tax.

Property tax is administered by the municipality where the property is located. The subject of land tax is land in the territory of the Slovak Republic in the following aggregation:

- arable land, hops, vines, fruit orchards, permanent grassland;
- gardens;
- built-up areas and courtyards, other areas;
- forest land with economic forests, fish ponds and other economically exploited water areas;
- building lands.

The assignment of the land to the respective group is determined by the land classification according to the cadastre. The tax base for land tax is the value of the land multiplying the area of land in m² and the value of the land to 1 m² (according to Annex one of applicable law). The prices

of land per square meter are stated in the law and the values of these prices for the building lands are differentiated according to the number of municipality inhabitants. These spreadsheets for taxation have been consistent for several years.

Under this Act No. 582/2004, a building land is understood to be a land for which a valid building permit is issued until a final building approval decision is issued for a building located on that site, the total area of such a building land covering all parcels located in the statutory building permits. From the point of view of this characteristic, it is obvious that the building land is the land for which the building permit is issued, and it is necessary to realize the important fact that for the issuing of a building permit it is necessary that the land must be located in the municipality intravilan and in the space defined in the territorial plan of municipality, which allows construction in the given locality. As a building land, we can therefore consider all the lands located in the intravilan of the municipality (in the built-up area of the municipality) for which a building permit can be obtained and also all the land in the immediate vicinity of that territory, as the municipality's territorial plans change due to the growing demands for housing. Within the division of land, the built-up areas represent a direct part of the building land, as it is the space on which the buildings stand, respectively space in the immediate vicinity of these buildings.

In foreign studies, many researches deal with the impact of different types of tax on real estate prices, respectively, the impact of income tax on property prices [2, 3, 4, 11, 12]. Real estate and taxation of real estate were being studied by Hartzell et al. [7], who examined the impact of inflation, Sirmans et al. [14], who, through hedonic pricing models, are trying to estimate house prices. Pasour [13] investigated the impact of taxes on immobility on farm real estate. Kim [8] explored price bubbles in the Korean and Japanese real estate markets and explains how this bubble on real estate impact taxes. Follain et al. [6] states that it is important to understand real estate provisions for the correct adjustment of the tax system and also important for tax reform.

3 Data

The object of this paper are building lands in Slovakia, their market prices and

the determinants of these building land prices in the context of the real estate taxation system. Due to the absence of a database of already realized prices of building lands, we used advertised prices of building lands from www.reality.sme.sk. As part of the research, a database of 2920 advertised building lands from the whole of Slovakia was disposed from year 2015, and database of 1898 advertised building lands from the whole of Slovakia from year 2017. The database includes a sample of 960 building lands within 96 randomly selected cities and 96 randomly selected villages, in which five building lands were randomly selected. Within the econometric models, municipal characteristics were used as explanatory variables and potential determinants of building land prices. These are their municipal characteristics: population of municipality, population structure, unemployment of municipality, municipality structure.

In the following Table 1, the basic descriptive statistics for the prices of examined building lands in the years 2015 and 2017 within the regions and Slovakia are given. General summary of all investigated variables and their description is listed in the Table 2.

Table 1

Prices in Eur per square meter of building lands in the regions of Slovakia

	Mean		Median		Minimum		Maximum		Std. Dev.	
	2015	2017	2015	2017	2015	2017	2015	2017	2015	2017
TN	33,84	35,90	28,00	30,69	1,00	2,80	259,33	120,00	26,27	22,54
PO	37,35	43,99	33,00	39,50	4,04	5,33	95,85	160,00	20,43	30,31
BB	39,85	39,09	36,13	30,00	2,00	0,40	133,06	159,02	26,42	32,45
BA	158,63	168,50	99,24	111,88	1,00	10,00	1 610,70	1 300,00	164,39	182,38
KE	51,81	36,64	39,61	20,00	2,06	1,30	250,00	264,26	43,97	42,61
NT	33,76	38,22	25,00	28,90	3,73	2,28	165,00	214,29	27,86	31,62
TT	41,00	51,35	35,00	43,00	3,20	3,68	304,00	331,94	29,58	41,72
ZA	40,19	40,30	32,00	35,00	2,38	4,01	408,33	110,00	31,43	22,19
SK	74,88	74,86	44,00	44,00	1,00	0,40	1 610,70	1 300,00	107,58	112,30

Source: Own processing.

Note: TN – Trnava region, PO – Prešov region, BB – Banská Bystrica region, BA – Bratislava region, KE – Košice region, NT – Nitra region, TT – Trnava region, ZA – Žilina region, SK – whole country

Table 2

Variable definitions

Variable	Definition
PricePs	Price per square meter of building land
ActivToPop	The ratio of economically active population to total population
BuiltUpArea	Ratio Built-up area of municipality/(built-up area + garden)
Pop	Population of the municipality
Unemploy	Ratio: Unemployed/(unemployed + workers)

Source: Own processing.

4 Methodology

As part of the used methodology are mainly used lin-lin ad log-log econometric models as a comparison of the current system of building lands taxation according to table prices linked to the population of municipality.

Let assume the model in the following form:

$$\boldsymbol{y} = \boldsymbol{X\beta} + \boldsymbol{u} \qquad (1)$$

where $\boldsymbol{y}$ is the vector of a dependent variable, $\boldsymbol{X}$ is the matrix of independent variables, $\boldsymbol{\beta}$ is the vector of unknown parameters, and $\boldsymbol{u}$ is the vector of error terms.

For $\boldsymbol{\beta}$ we can use different estimation methods to estimate the value of these parameters (estimators). Then, for the vector of dependent variables $\hat{\boldsymbol{y}}$, the following applies:

$$\hat{\boldsymbol{y}} = \boldsymbol{X}\hat{\boldsymbol{\beta}} \qquad (2)$$

where $\boldsymbol{X}$ is the matrix of independent variables, and $\hat{\boldsymbol{\beta}}$ is the vector of estimated parameters. Then for the vector of residuals $\boldsymbol{e}$ applies:

$$\boldsymbol{e} = \boldsymbol{y} - \hat{\boldsymbol{y}} = \boldsymbol{y} - \boldsymbol{X}\hat{\boldsymbol{\beta}} \qquad (3)$$

To estimate parameters of the linear regression model (1), ordinary least squares (OLS) method is frequently applied. This method minimizes the sum of squared residuals S [5, 15]:

$$S = \sum_{i=1}^{n} e_i^2 \qquad (4)$$

The OLS is an approach, which estimates conditional mean. Koenker [9] argues that for each probability distribution of a parameter, we want to know not only the mean but also variance, skewness, kurtosis, boxplot or histogram for better knowledge of the data we study. Therefore, he decided to apply similar approach about more complex information also in regression [10]. He replaced the conditional mean estimate (classic OLS method) by several estimates of conditional quantiles, where the sum S is minimized:

$$S = \sum_{i:y_i \geq \hat{y}_i}^{n} q|e_i| + \sum_{i:y_i < \hat{y}_i}^{n} (1-q)|e_i| \qquad (5)$$

where the weight $\boldsymbol{q}$ is the value of particular quantile and it holds that $0 < q < 1$. Then positive residuals acquire the value q and negative residuals the value *(1-q)*.

Then for quantile regression we assume the model in the following form:

$$\boldsymbol{y} = \boldsymbol{X}\boldsymbol{\beta}_q + \boldsymbol{u} \qquad (6)$$

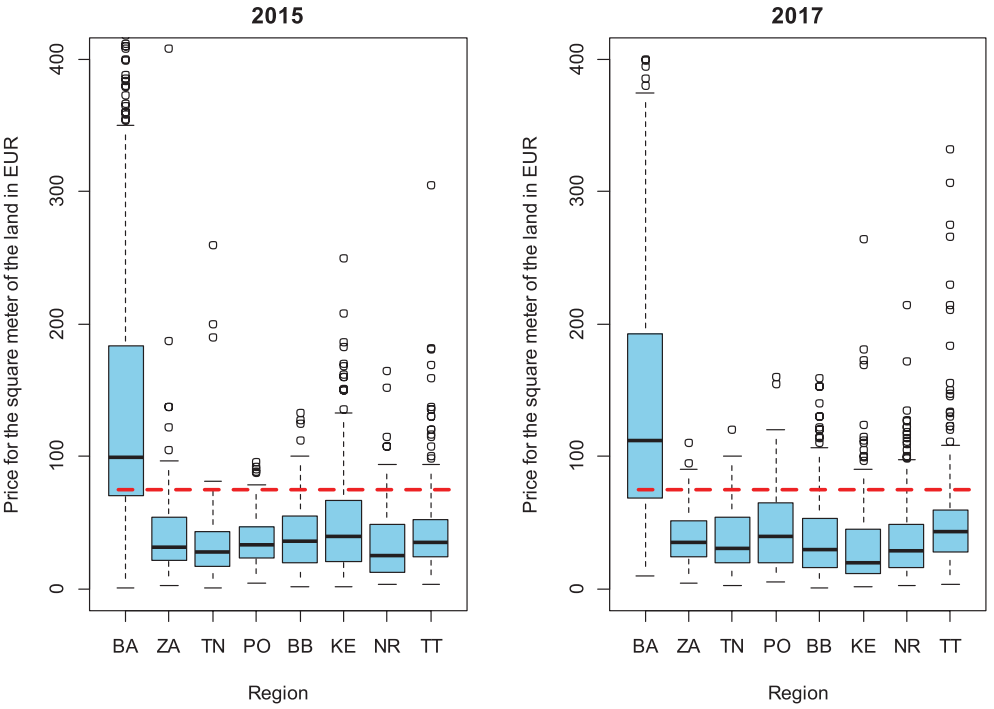
where $\boldsymbol{y}$ is the vector of a dependent variable, $\boldsymbol{X}$ is the vector of an independent variable, $\boldsymbol{\beta}_q$ is the vector of parameters for particular $\boldsymbol{q}^{th}$ quantile and $\boldsymbol{u}$ is the vector of error terms.

5 Results

The main goal of this paper is in direct relation to the market prices of building lands in Slovakia. Due to the absence of a unified database of already realized real estate prices, the advertised prices of building lands have been used, despite the existence of a premium (the difference between the advertised and the realized price), providing relevant results, especially in using of econometric models. Next Figure 1 shows the variability of 2920 prices of building lands within the regions and the whole of Slovakia in the year 2015 and the variability of 1898 prices of building lands within the regions and the whole of Slovakia in the year 2017.

Figure 1

Boxplots of building land prices for years 2015 and 2017



Source: Own processing in R[3].

The average price of the building land within the observed building lands in the year 2015 was 74.86 EUR per square meter, the average price of the building land for the year 2017 was 74.88 EUR per square meter (in Figure 1 this average prices represents the red dotted lines). When examining the price variability of building lands within regions, it is obvious that in the Bratislava region the price of building lands (and average) is much higher than in other regions in the year 2015 and 2017. Price variability in other regions is very similar. An interesting observation is the change in the variability during the years 2015 - 2017. The biggest change is observed within the Košice region – in the year 2015 there was the highest average building land price for Košice region compared to other regions, but in the year 2017 there is in the Košice region the lowest average building land price compared to other regions. This fact can be seen in Figure 1 and Table 1, where the difference between the average price of building lands in Košice region for year 2017 and 2015 represents a difference of 15,17 EUR per square meter. It is obvious that the greatest difference in the price variability of building plots is between Bratislava and other regions.

[3] The red dashed line represents the average price of building lands in Slovakia.

It is important to note that there are used advertised prices, which in the case of the existence of a price premium, mean that the realized market prices of building lands are in fact lower than the advertised prices. The amount of this difference depends on the type and amount of the price premium (percentage, constant price premium). However, in the case of the existence of a percentage price premium and using a logarithmic-linear or logarithmic-logarithmic econometric model, the estimates of coefficient parameters within the econometric models are the same as the use of market prices of building lands.

After the analysis of building land market prices in Slovakia (primary on the supply side, which characterizes advertisements) for year 2015 and 2017, we will focus on the prices of building lands used in the taxation of building lands in Slovakia in the following section. The prices of building lands are not determined separately for each municipality, but the price of building lands for tax purposes is based on the following Table 3.

Table 3

Prices of gardens and building lands for taxation in the Slovakia

Population of municipality	Prices of gardens in EUR/m^2	Prices of building lands in EUR/m^2
0 - 1 000	1,32	13,27
1 001 - 6 000	1,85	18,58
6 001 - 10 000	2,12	21,24
10 001 - 25 000	2,65	26,55
over 25 000	3,31	33,19
District towns	4,64	46,47
Regional cities	5,31	53,11
Bratislava	5,97	59,74

Source: Own processing in R.

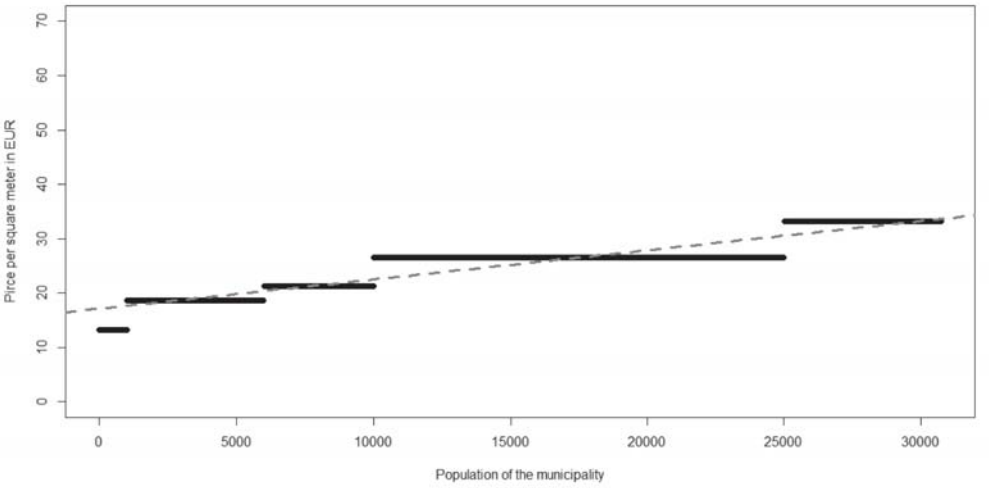
It is clear that the only element that ensures the difference of land prices is the population of municipality. The prices of building lands for taxation and municipalities with less than 1000 inhabitants are set at 13.27 EUR/m^2, while the highest prices for building lands are typical of Bratislava and the level of these prices for taxation is 59.74 EUR/m^2. Interestingly, it can be noticed that the prices of gardens in this table are ten times lower than those of building

plots. From the prices of building plots mentioned in this law we can state that the only characteristic that determines the price of the building lands and ensures the difference of the tax burden presents the size of the municipality in terms of the municipality population.

The visual display of the relationship between the population of municipality and the level of the prices of building lands used for taxation shows a slight tax burden differentiation and a low level of fairness, as for example the same level of building land prices are used for municipalities with 10001 inhabitants and municipalities with 25000 inhabitants. Black horizontal lines in the following Figure 2 represent the official prices of building lands for taxation in municipalities with different numbers of inhabitants.

Figure 2

Prices of building lands for taxation



Source: Own processing in R.

The red dashed line has a slope about 0,0005385 and this slope of this line has been estimated by the least squares method, which minimizes the sum of squares of residues. The slope of this regression line says that any increase of 1000 inhabitants in the municipality means an increase in the price of building land by approximately 0,5385 EUR/m^2.

As part of our research, we have decided to verify whether the official prices of building lands for taxation reflect the current state of market prices of building lands. Using a database of 960 randomly selected building lands of

the year 2015 we had available information on the prices of these lands and also information on the number of inhabitants of the municipality, in which the land was locate. We made an econometric model in the following form:

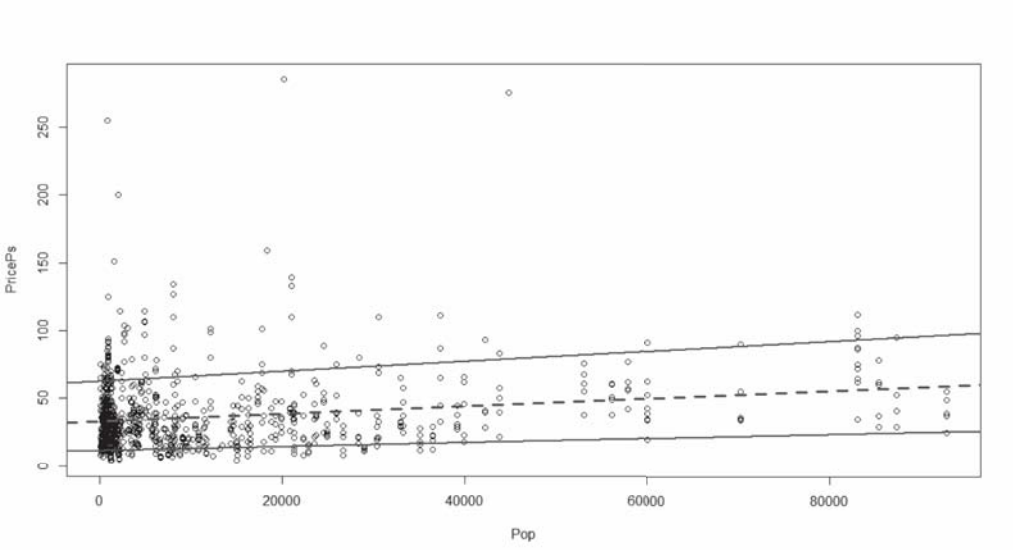
$$PricePs = \beta_0 + \beta_1 * Pop + \varepsilon \qquad (7)$$

where *PricePs* represents the price of a building land and *Pop* represents the number of ihabitants of the municipality in which the building land is located.

We used the OLS method and conditional quantile regression method as the estimation method for estimating the parameters β_0 and β_1. Next Figure 3 shows the prices of building lands in relation to the population of municipality.

Figure 3

Advertised prices of building lands



Source: Own processing in R.

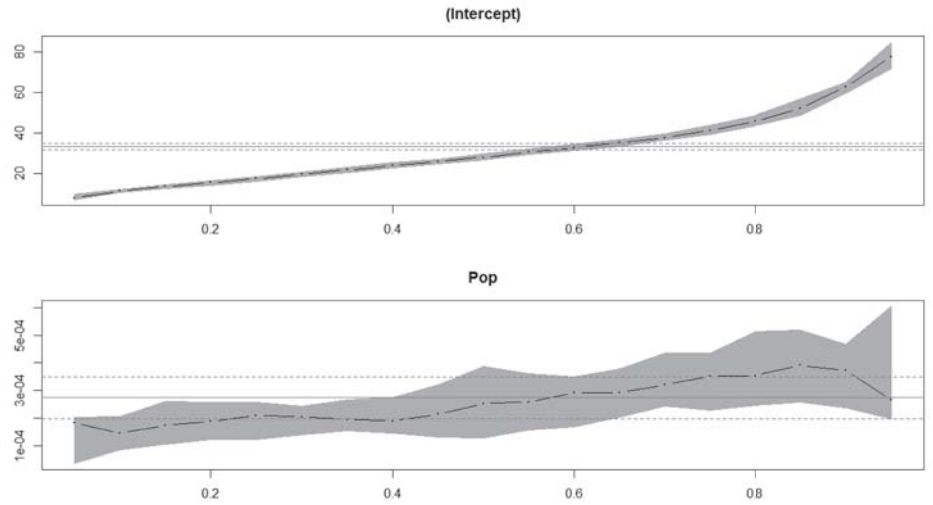
Blue dashed line in Figure 3 represents a regression line which was estimated by the least squares method and the slpe of this regression line is approximately 0,000239398. In terms of statistical significance, the slope of this regression line is different from zero in 0.01 % significance level. On the basis of these empirical data, we can interpret this slope that, with every increase in population of 1000, the average price of building lands will increase by approximately 0,2394 EUR/m^2. In addition to the conditional

average presented by the OLS estimated regression line slope, we can also model the conditional quantiles of the probability distribution of building lands price. The blue lines in Figure 3 represent the regression lines for the 0,1-th quantile and the 0,9-th quantile, thus modeling the low-priced and high-priced building lands within different municipalities (in terms of number of inhabitants). The blue line with a lower intersection has the value of the slope 0,00013, and the second blue line has the value of the slope 0,00045, which means that any increase in the population by 1000 for the most expensive building lands in the municipality means an average increase in the price of these lands by 0,45 EUR/m^2, while any increase in the number of inhabitants by 1000 for the cheapest building land in the municipality means an increase in the price of these lands by 0,13 EUR/m^2 on average.

The use of quantile regression allows us to identify the variability of building land prices in terms of the size of the municipality (in terms of municipality population). Estimates of the regression coefficients for the variable *Pop* (population of municipality) in the econometric model considered for the different levels of quantiles are presented in the following Figure 4. Obviously, with the increase of the examined quantile, the value of the regression coefficient increases, which means that the variability of building land prices in the larger municipalities (in terms of the number of inhabitants) is increasing.

Figure 4

Quantile regression coefficient estimates for different quantiles

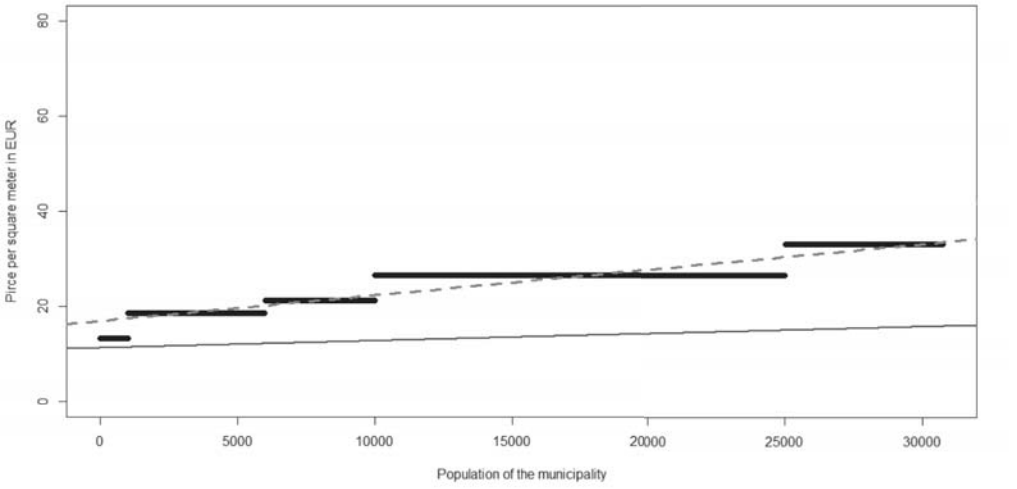


Source: Own processing in R.

The obtained empirical results and their comparison with the actual official prices of building lands for taxation is presented in the following Figure 5, which collects information on market prices and official prices for real estate taxation in relation to the population of the municipality.

Figure 5

Regression lines for advertised building land prices and prices for taxation



Source: Own processing in R.

We can notice that the relationship between the official prices of building lands for taxation and the number of inhabitants of the municipality does not reflect the current state of relationship between market prices and the number of inhabitants. From Figure 5, it is evident that the actual average price of building lands (blue dotted line) for a municipality with a different population size is actually higher than the currently official average prices for taxation (black horizontal lines). The level of differentiation of these average prices is in the actual market prices of building lads different and, according to empirical data, from the point of view of the average there is not such a significant difference between the average price of building lands in a low-population municipalities and hihg-population municipalities than in the currently system of taxation.

Also, we may notice that the current system of taxation best estimates the market price of the cheapest building lands in municipalities with low population and the market price of average building lands in municipalities with high population. The red dashed line, presenting the current average

prices of building lands for taxation, does not reflect the current building land market prices situation, where the apparent average market price of building lands in municipalities is currently much higher.

In the case of using only one variable for estimating the average building land price of municipality for taxation, it would be appropriate to adjust these prices in the law following the advertised (market) prices of building lands that would ensure higher system fairness in the context of current market prices of real estate. However, it is important to note the fact that the difference between the most expensive and cheapest lands in the municipalities is significant and far from the average, which means that the owners of the most expensive lands in the municipality benefit from a tax advantage over the owners of the cheapest building lands.

Another alternative suggestion for changing this taxation system and considering only one characteristic that will ensure a differentiation in average building land prices is the municipality's unemployment rate instead of the population, which estimates the building land prices better and from this point of view ensures a better and fairer differentiation than the population of municipality (from the viewpoint of R^2 model comparisons) or an alternative to use more characteristics in estimating the average building land prices (from the point of view of R^2, for example econometric model with more explanatory variables as population, unemployment, economic structure of the population, municipal structure), which will provide even better explanation of variability of endogenous variable.

6 Conclusion

Based on empirical research of advertised building land prices, we can review that the established system of taxation of building lands linked to the population of the municipality does not reflect the current relationship between the average market prices of building lands and the population of the municipality. In addition to changing current building prices of the lands in the law in view of the municipality population it is possible to consider another characteristic which better explains the prices of the building lands in the municipality (especially unemployment of municipality). When introducing a new system of taxation linked to market prices, it is also possible to consider a new system based on the use of several characteristics that will estimate the average price of a building lands in the municipality (for example: the

economic structure of the municipality's population and the municipality structure). Also, with the new system of taxation, it is also important keep in mind fact, that variability in the prices of building lands in municipality increases with the size of the municipality.

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