

The effect of perpetual usufruct on single-family house prices in Poznań

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Abstract. The paper explores the influence of the perpetual usufruct (a form of owning the ground similar to a long-term lease in Poland) on house prices in Poznań. The research is based on a data set of 1074 geo-coded single-family houses transactions for the years 2010 to 2015. In this research, the hedonic method was used in Ordinary Least Squares (OLS), Weighted Least Squares (WLS) and Median Quantile Regression (Median QR) models. We found substantial evidence that single-family houses constructed on perpetual usufruct lots are discounted on average at 4.1%.

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1. INTRODUCTION

Ground leases are a policy instrument the purpose of which is to a time-limited division of the bundle of rights between a public landowner and the ground leaseholder, who becomes the owner of the facilities on the land for a defined time (Gerber, Nahrath, & Hartmann, 2017; Löhr, 2017). Ground leases are often used for retail, office, and industrial developments in the U.S. and many other countries (M. TrojaneK, Anholcer, Banaitis, & TrojaneK, 2018). In addition, the construction of privately-owned housing on leased public land as a way of implementing land use policy is typical in a number of countries and specific cities (Głuszak, 2008).

Perpetual usufruct is one of the forms of management of the public real estate. In the Polish legal system, perpetual usufruct was legally regulated in 1961 when state ownership was the dominant form of ownership. This right was intended by the legislature to regulate the relations of ownership between the

state and private sector entities. Current perpetual usufruct regulations differ significantly from those introduced in 1961 by the Law on Land Economy in Cities and Settlements (Sejm Rzeczypospolitej Polskiej, 1961; Truskiewicz, 2006). Besides, despite the dwindling presence of the political reasons for the introduction of this right, perpetual usufruct continues to play a crucial role in the real estate rights system and affects various aspects of social and economic life.

However, as the right can now be legally converted, its scope has steadily diminished since 1997¹; and in 2018, the right of perpetual usufruct of the land developed for housing purposes was converted *ex officio* into the property right (art. 1, par. 1 of the Act of 20 July 2018 on the Conversion of the Right of Perpetual Usufruct of Developed Land for Housing Purposes – the Journal of Laws 2018, item 1716).

The right of perpetual usufruct of land played a considerable role in the process of the system transformation of the economy and the state administration (the process of enfranchising state legal persons). The right of perpetual usufruct of land as a housing policy instrument provided investors (private individuals and housing cooperatives) with land on favourable terms. The perpetual usufructuary is charged an initial and annual fees for transferring land property into perpetual usufruct. The amounts charged depend on the development purpose of the transferred property. In the case of land property transferred for housing purposes, the initial amount is 15% and the annual fees are 1% of the property value. The amount of the annual fees for perpetual usufruct is regularly updated, but no more often than once in every three years, on condition that the property has risen in value.

The right of perpetual usufruct of land shares the same attributes with the property right (it is a transferable, portable and hereditary). However, some other attributes of this right (as shown in Table 1) make this right less favourable/less effective than the property right. Hence, the following question: how does the property market value those two rights? Are the prices of houses built on the land transferred for perpetual usufruct any lower, and if so – how much, than those of the houses developed on the land that belongs to the investor? The right of perpetual usufruct of land is the right to property owned by others (land that belongs to the State Treasury, local governments and their units) that provides the perpetual usufructuary (natural persons or individual persons) with powers similar to those of the property right. The right in question, like the property right, is a transferable right (which means it can be sold), portable (which means it can be used to make in-kind shares), and hereditary (which means it can be used to make donations or heritage). However, the property right and the right of perpetual usufruct of land share a number of noticeable differences which concern:

- the duration of those rights. The right of perpetual usufruct of land is a temporary right with land being provided for 40 or 99 years, or extended, optionally,
- the property of the buildings and structures founded on the land,
- the possibility to extend the duration of the right,
- the way of financial settlements of the buildings or structures founded on the land,
- bearing the fees for land use,
- the rules for calculating the fees for land use,
- the possibility to terminate the agreement early,
- the subject of turnover,
- the subject of right.

A comparison of those rights is presented in Table 1.

¹ Cf. the Act of 4 September on the conversion of the perpetual usufruct available to natural persons into the property right (the Journal of Laws 1997, No. 123, item 78).

Table 1

Comparison of the perpetual usufruct of land and the property right

	The attributes of the rights	Perpetual usufruct of land (PUL)	The property right
1.	Subject of right	The subject of PUL is land only. The buildings and structures founded on the land are sole property of the perpetual usufructuary (they are of building property status)	The subject of property right is land along with the buildings and structures founded on it
2.	The land and the buildings and structures founded on it	The land – the property of the State Treasury and local government units	The land and the buildings and structures founded on it as the component part of the property constitute the component part of the land
3.	The duration of the right	40 or 99 years, depending on the purpose	Without time limitations
4.	Possibility to be extended	For 40 or 99 years	It is a right of unlimited duration
5.	The way of settling the investment outlays relating to the buildings or other structures developed or acquired by the perpetual usufructuary	The amount of remuneration ought to reflect the market value of those buildings and structures on the date of the PUL expiration	They are a component part of the land and belong to the person who has the right to the land
6.	Determining the way of using the land within the duration of the right	The agreement on transferring the land into perpetual usufruct determines the way and date limit of its development, including the date limit of its development following the purpose for which the land was transferred	The owner can use the land under the rules set out in acts and the principles of social coexistence
7.	The fees charged <ul style="list-style-type: none"> • initial fee • annual fees 	The amount of fees depends on the purpose for which the property was developed	Not applicable
8.	Rules for calculating fees	The amount of the initial fee is 15% to 25% of the land property price; The amount of annual fees, depending on the purpose, varies between 0.3% to 3% of the price. This fee can be updated every 3 years or less often, on condition that the property value has increased	Not applicable
9.	The possibility to terminate the agreement prior to the date set out in the agreement	<ul style="list-style-type: none"> • if the perpetual usufructuary misuses the property by violating the terms of the agreement • if the perpetual usufructuary fails to develop the land within the date limit detailed out in the agreement 	Not applicable
10.	The right to use the land and the buildings and structures founded on it	<ul style="list-style-type: none"> • transferable • portable • hereditary 	<ul style="list-style-type: none"> • transferable • portable • hereditary
11.	The subject of turnover	The subject of the transaction is the right of perpetual usufruct and the property right to buildings and structures (building property)	The subject of the transaction is the property right to the land and the buildings and structures founded on it

12.	The subject of right	The subject of PUL is land only. The buildings and structures founded on the land are property of the perpetual usufructuary (they enjoy the building property status)	The subject of the property right is the land along with the buildings and structures founded on it
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Source: own elaboration.

2. LITERATURE REVIEW

There is an extensive body of literature investigating characteristics influencing the real estate prices. However, only in few pieces of research, the issue of ground leasehold has been taken into account. In most cases, the results suggest a negative influence on real estate prices and they differ according to leasehold form, real estate being investigated. Some results of these studies are presented below.

Tyvima et al. (2015) basing on regression analysis of sales prices of condominium transactions (52.930 observations) in Helsinki examined the effect ground leases have on apartment prices. The study carried out that prices on condominiums constructed on leased plots are discounted at least 5% on average. Moreover, they found that the announcement of potentially significant increases in base rents upon renewal contributes to the discount.

Caesar et al. (2019) analysed the effect of leasehold status on the price of cooperative apartments. They used 36.912 information on transactions in Stockholm, during 2012 to mid-2014. The conducted research confirmed that leasehold status (meaning that the cooperative does not own the land that the apartment building occupies) has a negative impact on price. The hedonic models indicate that apartments with leasehold status are cheaper by 2.3%. Moreover, the conducted analysis showed that at the time of renegotiation, leasehold depreciates price with 4.2%.

The relation between the values of the ownership title and perpetual usufruct in case of undeveloped grounds for single-family houses in case of Poland was investigated by Foryś and Gaca (2018). In their study, they used the transactions (131 observations) concluded between the years of 2013–2015 in two districts of Bydgoszcz. The results showed that the difference between the average prices of the ownership titles and of perpetual usufruct amounted from 5.3% to 17% depending on the district.

Giglio, Maggiori and Stroebel (2015) examined residential housing markets in the UK and Singapore. By comparing transaction prices across freeholds and leaseholds they found that 100-year leaseholds are valued 10–15% less than otherwise identical freeholds; leaseholds with maturities of 125–150 years are valued 5–8% less than freeholds. Moreover, there are no price differences between leaseholds with maturities of more than 700 years and freeholds.

Irumba (2015) used hedonic models to investigate the relationship between housing prices, land tenure and housing attributes basing on a cross-sectional dataset of transaction prices for 590 newly. The obtained results were in opposition to the other researches. Compared to freeholds, public leaseholds in Kampala offer a 23 percent premium in housing values. The explanation of this could be due to a lack of formal systems for the assessment of leasehold premium and ground rent charges, an arrangement which can offer utility to the lessee at the expense of lessor, thereby making leaseholds popular on the market, or the developers' lack of information on the benefits of freehold causing them to value leaseholds higher than freeholds.

3. METHODOLOGY

The hedonic method was used in this research. Ridker was probably the first researcher to use the hedonic method to analyse the real estate market—aimed at identifying the impact of the reduction of pollution on house prices (Coulson, 2008). The theoretical framework of the hedonic method has been developed by Lancaster (1966) and Rosen (1974). The essence of the hedonic method lies in the assumption that the price of heterogeneous goods may be linked to its attributes. In other words, this method may be used to estimate the value of the particular attributes of a given product. The price of a given item is the response variable, while its quantitative and qualitative attributes are the explanatory variables. The equation may be written as follows (1):

$$y = X\beta + \varepsilon \quad (1)$$

where dependent variable y is the price (e.g., the price of a dwelling); X is an array of independent variables, a selection of relevant characteristics explaining the price; β is a vector of parameters to be estimated and ε is the vector of error terms.

In this research, we used several variants of hedonic regression, namely standard Ordinary Least Squares (OLS), robust Weighted Least Squares (WLS) and Median Quantile Regression (Median QR) models. We use different estimation techniques to ensure the results are robust and reliable. The housing literature is quite consistent in treating housing as heterogeneous in many dimensions. From econometric (or data analysis) perspective, this heterogeneity can produce heteroscedasticity in the residuals, while estimating the price function using standard OLS. Therefore, we decided to address the problem using different analytical approaches. First, a robust model using OLS with heteroscedasticity-correction (WLS) has been estimated. Second, we decided to use the median quantile regression. The quantile regression relies on minimisation of weighted absolute deviations, and during the process, conditional quantiles (percentile) functions are estimated (Koenker & Bassett, 1978; Koenker & Hallock, 2001). In this research, we decided to use symmetric weighting (quantile-0.5). Within the quantile regression approach, there is no limitation imposed on explaining the mean of the dependent variable. The quantile regression is more flexible, as it can be used to explain the implicit prices of housing attributes at any point of the distribution of the dependent variable, thus for low-priced, medium-priced, and high-priced properties (Zietz, Zietz, & Sirmans, 2008). The technique can be particularly useful in the case of heteroscedasticity, outliers, and unobserved heterogeneity found in the empirical data on housing transactions (Liao & Wang, 2012).

4. DATA

The scope of the subject includes the secondary housing market. The research is based on 1074 transactions conducted from 1st quarter of 2010 to the 4th quarter of 2015 was obtained from the Board of Geodesy and Municipal Cadastre in Poznan (Figure 1). In the process of data cleaning, purchases of more than one residential unit and non-free market transactions (e.g. debt collector sale) were removed. The data included in notarial contracts concerning houses contain the following information: the transaction date, the price, the area of the plot, gross covered area. Then, thanks to the cadastre data, a great deal of information on the number of floors and the year of construction was added. Using the Street View application on maps.google.com, the missing data concerning the number of overground and underground floors and the year of construction was provided. Moreover, we specified the type of roof (flat, sloping), the type of building (detached, semi-detached, terraced), the type of garage (an integral part of a house or detached), and, first of all, the technical condition of a building on the basis of external elements (based on historical photos). There is no doubt that what is an essential factor in terms of value is floor space. Unfortunately, it is included in less than 10% of observations in notarial deeds. That is why we decided to

establish the area of a building taking into account: built-up area, number of overground floors, correction factor, the existence of garage and type of the roof.

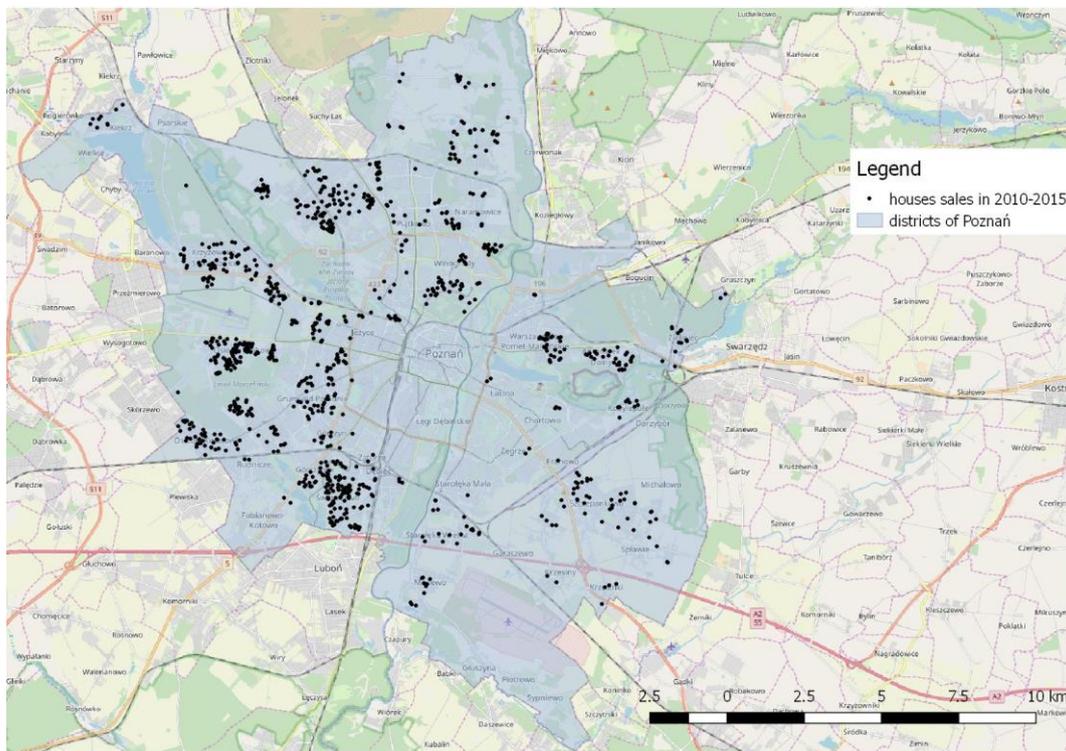


Figure 1. Property transactions included in the analysis in Poznań in 2010-2015

Source: Based on the Board of Geodesy and Municipal Cadastre in Poznań, OpenStreetMap and own research.

Table 2 summarises the descriptive statistics (mean values) of the variables used in the research. Based on a right to the plot, we sort the housing transactions into a group consisting of properties with perpetual usufruct (124 observations) and a group of properties with property right of the plot (948 observations). We used the transaction prices in the logarithm term as the response variable in our model.

Table 2

Descriptive statistics of single-family house transactions

	Land – property right	Land - perpetual usufruct
y2010	0,15	0,23
y2011	0,16	0,13
y2012	0,15	0,08
y2013	0,16	0,20
y2014	0,18	0,19
y2015	0,21	0,17
area	164,05	170,15
transaction price (in PLN)	625041,46	595458,40
age	28,55	22,95
q1	0,17	0,12
q2	0,26	0,32
q3	0,27	0,27
q4	0,30	0,28

underfloor	0,42	0,49
garage_in	0,49	0,65
garage_out	0,27	0,15
plotarea	520,01	344,84
distance to CC	5933,70	5853,25
distance to green	399,79	287,48
distance to school	711,55	862,08
number of observations	948	124

Source: own elaboration.

4. EMPIRICAL RESULTS AND DISCUSSION

In our hedonic models of single-family houses, we used: year of the transaction, the area of the house, age of the building, underground floor, quality of the building, basement, garage (inside or outside), type of plot ownership, distance to the city centre, urban green areas and schools. The choice of qualitative and quantitative data was limited by the availability of information in the database. Table 3 presents the variables used in the study of single-family houses.

Table 3

Qualitative and quantitative variables applied in the models in case of single-family houses

Variable	Symbol	Description
price	price	price for property (in pln)
year	y2010, y2011, y2012, y2013, y2014, y2015	6 time dummy variables used in the global model. if the apartment was sold in a given year, it takes the value 1; otherwise, it takes 0
area	area	area of building = built-up area x number of overground floors (the type of roof taken into account) x 0.8–20 m ² (if there is a garage in the building)
age	age	age of the building
quality	q1—the building is in bad condition q2—the building is in average condition q3—the building is in good condition q4—the building is in very good condition	4 dummy variables. if the apartment is located on a given floor, it takes the value 1; otherwise, it takes 0
underground floor	underfloor	if there is an underground floor than 1, if not 0
garage inside	garage_in	if there is a garage in inside the building than 1, if not then 0
garage outside	garage_out	if there is a garage in outside the building than 1, if not then 0
area of plot	plotarea	area of plot
pul	pul	0—ownership of the plot 1—perpetual usufruct
city centre	dcc	distance to the city centre (m)
green	green	distance to nearest urban green areas (m)
school	school	distance to nearest school (m)

Source: own elaboration.

Hedonic regression equations using ordinary least squares with heteroscedasticity-correction, median quantile regression have been projected to solve study issues. The dependent variable was the natural log of the sales price. Then, Gretl software was used to estimate the parameters of functions in which the *lnprice*

of a house was the response variable. The estimation results for single-family houses are presented in Table 4.

Table 4

Estimation results (dependent variable is a natural logarithm of single-family house sales price)

variables	OLS		WLS		QR	
	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
const	13,1383	<0,0001	13,154	<0,0001	13,1353	<0,0001
y2011	-0,04264	0,102	-0,03673	0,1258	-0,01426	0,614
y2012	-0,14793	<0,0001	-0,14334	<0,0001	-0,13445	<0,0001
y2013	-0,17755	<0,0001	-0,18328	<0,0001	-0,16092	<0,0001
y2014	-0,16459	<0,0001	-0,17607	<0,0001	-0,16335	<0,0001
y2015	-0,18984	<0,0001	-0,19419	<0,0001	-0,17811	<0,0001
PU	0,002654	0,0001	0,002564	0,0002	0,002246	0,003
PU2	-2,68E-06	0,1333	-2,82E-06	0,127	-1,94E-06	0,3164
age	-0,00748	<0,0001	-0,0073	<0,0001	-0,00844	<0,0001
age2	5,18E-05	0,002	4,85E-05	0,0092	6,88E-05	0,0002
underfloor	0,053256	0,0007	0,044374	0,0019	0,058185	0,0007
q2	0,103118	<0,0001	0,101155	<0,0001	0,139	<0,0001
q3	0,185823	<0,0001	0,188853	<0,0001	0,205811	<0,0001
q4	0,37589	<0,0001	0,365562	<0,0001	0,388868	<0,0001
garage_in	0,088015	<0,0001	0,083406	<0,0001	0,084125	<0,0001
garage_out	0,066424	0,0016	0,064872	0,0011	0,059988	0,0084
plotarea	0,000257	<0,0001	0,00026	<0,0001	0,000297	<0,0001
dcc	-4,53E-05	<0,0001	-4,19E-05	<0,0001	-4,09E-05	<0,0001
green	-0,0001	0,0001	-9,87E-05	<0,0001	-0,00014	<0,0001
school	-4,83E-05	0,0009	-6,42E-05	<0,0001	-5,08E-05	0,0013
pul	-0,0402	0,0844	-0,04311	0,0237	-0,04235	0,0936
R-squared	0,55		0,57		-	
N	1074		1074		1074	

Source: own elaboration.

The estimated models explained from 55-57% of the price variations, depending on the estimator. Almost all of the variables applied in the models turned out to be statistically relevant, and the expected coefficient signs were correct. The coefficients of time-dummy variables suggest that housing prices decreased significantly in the analysed period. It is worth mentioning that housing prices in the biggest cities in Poland increased by about 100% between 2006 and 2007 (Belej & Kulesza, 2014; R. Trojanek, 2013). Taking into account the physical characteristics of houses, the impact of individual variables was consistent with expectations. Moreover, the increase in distance from the city centre, urban green areas and primary schools negatively affected the value of the apartment. This confirms the results of earlier studies in Poland (Cichulska & Cellmer, 2018; Czembrowski & Kronenberg, 2016; Renigier-Bilozor, Janowski, & Walacik, 2019; R. Trojanek, 2016; R. Trojanek, Gluszek, & Tanas, 2018; R. Trojanek & Huderek-Glupska, 2018).

From the perspective of this paper's objectives, the statistical relevance of the *pul* variable is essential. The application of the log-linear model enabled the percentage difference in the price of the same house build on perpetual usufruct and freehold ground to be identified. The value of the *pul* coefficient varied from -0.04311 to -0.0402, which indicates that a house with perpetual usufruct was about 4.1% cheaper than the house located on owned land.

5. CONCLUSION

The research findings reveal that the prices of houses built on the land with the right of perpetual usufruct are 4.1% lower than those of the houses developed on the land that belongs to the investor. This dependence confirms the fact that the less effective / less favourable right is valued less by the market. A typical buyer will pay less for the less effective right (perpetual usufruct) than for the more effective right (property right). The question is “why?” Without doubt, one of the reasons is the fact that the perpetual usufruct of land requires annual fees to be paid. Within the duration of the right, the buyer of a house developed on perpetual land will pay an annual fee to the owner of the land (the State Treasury or units of local government, typically – municipalities). The amount of the fee will vary. Statutorily, the owner of the land can make updates; however, no more often than once in every three years (until 2011, under the previous acts, updates could be made no more often than once a year, on condition that the property has increased in value). It should be stressed that the practice of annual fees updates varies between units and municipalities. Updates have been made rarely. For instance, in Poznań, as far as communal land is concerned, updates have been only made once in every 10 – 15 years, and as regards the land the property of the State Treasury fees updates have been made even more rarely. In consequence, that the updates have been made so rarely led to a rapid growth of the amount of the fees, and the issues in question have become subject of a heated discussion.

REFERENCES

- Belej, M., & Kulesza, S. (2014). Similarities in Time-Series of Housing Prices on Local Markets in Poland. *Real Estate Management and Valuation*, 22(3), 45–53. <https://doi.org/10.2478/remav-2014-0026>
- Caesar, C., Donner, H., & Kopsch, F. (2019). The impact of leasehold status on apartment price. *Journal of Housing Economics*, (April), 101629. <https://doi.org/10.1016/j.jhe.2019.04.001>
- Cichulska, A., & Cellmer, R. (2018). Analysis of prices in the housing market using mixed models. *Real Estate Management and Valuation*, 26(4), 102–111. <https://doi.org/10.2478/remav-2018-0040>
- Coulson, E. (2008). Hedonic Methods and Housing Markets Chapter 1: An Introduction and Discussion of Origins. *Hedonic Methods and Housing Markets*, 1–15.
- Czembrowski, P., & Kronenberg, J. (2016). Hedonic pricing and different urban green space types and sizes: Insights into the discussion on valuing ecosystem services. *Landscape and Urban Planning*, 146, 11–19. <https://doi.org/10.1016/j.landurbplan.2015.10.005>
- Foryś, I., & Gaca, R. (2018). Ownership and Perpetual Usufruct in the Valuation of Undeveloped Real Property on the Example of Parallel Markets. *Folia Oeconomica Stetinensia*, 18(1), 7–16. <https://doi.org/10.2478/fofi-2018-0001>
- Gerber, J. D., Nahrath, S., & Hartmann, T. (2017). The strategic use of time-limited property rights in land-use planning: Evidence from Switzerland. *Environment and Planning A*, 49(7), 1684–1703. <https://doi.org/10.1177/0308518X17701916>
- Głuszak, M. (2008). Użytkowanie wieczyste w kontekście rozwiązań stosowanych w wybranych krajach europejskich. *Świat Nieruchomości*, 68, 28–31.
- Irumba, R. (2015). An empirical examination of the effects of land tenure on housing values in Kampala, Uganda. *International Journal of Housing Markets and Analysis*, 8(2), 359–374. Retrieved from <http://dx.doi.org/10.1108/IJHMA-11-2014-0044>
- Koenker, R., & Bassett, G. (1978). Regression Quantiles. *Econometrica*, 46(1), 33. <https://doi.org/10.2307/1913643>
- Koenker, R., & Hallock, K. F. (2001). Quantile Regression. *Journal of Economic Perspectives*, 15(4), 143–156.
- Lancaster, K. J. (1966). A new approach to consumer theory. *Journal of Political Economy*, 74(2), 132.

- <https://doi.org/10.1086/259131>
- Liao, W. C., & Wang, X. (2012). Hedonic house prices and spatial quantile regression. *Journal of Housing Economics*, 21(1), 16–27. <https://doi.org/10.1016/j.jhe.2011.11.001>
- Löhr, D. (2017). Sustainable housing: A ground lease partnership model. *Land Use Policy*, 60, 281–286. <https://doi.org/10.1016/j.landusepol.2016.10.037>
- Renigier-Bilozor, M., Janowski, A., & Walacik, M. (2019). Geoscience methods in real estate market analyses subjectivity decrease. *Geosciences (Switzerland)*, 9(3). <https://doi.org/10.3390/geosciences9030130>
- Rosen, S. (1974). Hedonic Prices and Implicit Markets: Production Differentiation in Pure Competition. *Journal of Political Economy*, 82(1), 34–55.
- Sejm Rzeczypospolitej Polskiej. Law on the Economy of Land in Cities and Settlements, Pub. L. No. 159 (1961). Poland: Journal of Law.
- Trojanek, M., Anholcer, M., Banaitis, A., & Trojanek, R. (2018). A generalised model of ground lease pricing. *Sustainability (Switzerland)*, 10(9), 1–21. <https://doi.org/10.3390/su10093203>
- Trojanek, R. (2013). An attempt to identify the seasonality of housing prices in selected polish cities in 1996–2012. *Real Estate Management and Valuation*, 21(4), 96–109. <https://doi.org/10.2478/remav-2013-0041>
- Trojanek, R. (2016). The Impact of Green Areas on Dwelling Prices: the Case of Poznań City. *Entrepreneurial Business and Economics Review*, 4(2), 27–35. <https://doi.org/10.15678/EBER.2016.040203>
- Trojanek, R., Gluszak, M., & Tanas, J. (2018). the Effect of Urban Green Spaces on House Prices in Warsaw. *International Journal of Strategic Property Management*, 22(5), 358–371. <https://doi.org/10.3846/ijspm.2018.5220>
- Trojanek, R., & Huderek-Glapska, S. (2018). Measuring the noise cost of aviation – The association between the Limited Use Area around Warsaw Chopin Airport and property values. *Journal of Air Transport Management*, 67. <https://doi.org/10.1016/j.jairtraman.2017.12.002>
- Truskiewicz, Z. (2006). *Użytkowanie wieczyste. Zagadnienia konstrukcyjne*. Zakamycze Kantor Wydawniczy.
- Tyvimaa, T., Gibler, K. M., & Zahirovic-Herbert, V. (2015). The effect of ground leases on house prices in Helsinki. *Journal of Housing and the Built Environment*, 30(3), 451–470. <https://doi.org/10.1007/s10901-014-9424-3>
- Zietz, J., Zietz, E. N., & Sirmans, G. S. (2008). Determinants of house prices: A quantile regression approach. *Journal of Real Estate Finance and Economics*, 37(4), 317–333. <https://doi.org/10.1007/s11146-007-9053-7>