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## Article

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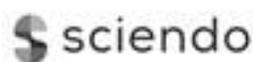
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# The influence of recurrent property income and expenditure on house prices in European Union countries: Evidence from a panel model

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## Abstract

Land value capture can be defined as a policy approach that allows communities to restore and reinvest land value increases that result from public investment and other government actions. For that reason, public action should generate public benefit. The recurrent property tax, one of many tools for land value capture, is the foundation of a stable, enduring revenue source that supports the provision of essential housing and amenities services. This empirical paper aims to examine the influence of recurrent property tax income, and general government spending on housing and community amenities on house prices. To assess the hypothesized direction of the effects, yearly data structured in a balanced panel on a sample of 26 European Union economies from 2010 to 2019 was used. Fixed effects regression model with Driscoll and Kraay standard errors was employed and the results confirmed a negative but statistically insignificant effect of increased property tax revenue on house prices, while increased expenditure on housing and amenities confirmed a positive and statistically significant effect on house prices dynamics in European Union countries.

**Keywords:** European Union countries, fixed-effects model, house prices, public value capture, tax on land and buildings.

**JEL classification:** C23, E62, H27, H76.

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## Introduction

Coming out of the economic and financial crisis, a Europe-wide problem becomes a shortage of financial resources to fulfil all their public commitments. For this reason, there is a growing interest in the most efficient tax instruments that governments can use to consolidate their fiscal position, and international institutions, academics, and tax experts put the accent on property taxes. Europe needs to enhance urgently the efficiency of public expenditure and find new, untapped sources of growth. Advocates for property taxes as a non-distortionary form of taxation for investment and labour choices that can help the fiscal gap are international institutions like the OECD (2010), Eurostat (Bizottság, 2014), the International Monetary Fund, etc. There are researchers that consider property taxes as an efficient and equitable fiscal remedy to public deficits and as a stimulus to economic recovery after the global financial crisis (Presbitero, Sacchi, Zazzaro, 2014). According to (Bizottság, 2014) policymakers have been attracted by recurrent taxes on real estate and put increasing attention on this instrument of taxation because in many countries property taxes were very low and offer a potential source for increasing revenue. At the same time, property taxes given the immobility of the tax base are considered to be the least detrimental to economic growth. Even though the concept of public value capture is not new, it became very much debated in the literature, as a method or a strategy to capture the value increase to be used for specific purposes. Urbanization requires increased funding for public infrastructure and services, meaning that government should try to capture a portion of this value to help fund and finance the specific project or future expenditures. In this perspective, one of the instruments for public value capture is the property tax on land and other immovable properties, which became a widely accepted means for public financial resources. But the effect of property taxes on house prices has always been a highly controversial issue (Netzer, Netzer, 1966). Property taxes have a potentially negative effect on the economy meaning that a greater recourse to property taxes is associated with lower house prices. The extent of decreased house prices will affect the real estate market. The property tax capitalization hypothesis assumes that a house is an asset like any other asset where price in equilibrium is equal to the present value of the after-tax flow of rents from owning it (Poterba, 1984). Consequently, capitalization of changes in property taxes leads to changes in house prices. An important fact for increased property taxes is that this revenue is mostly spent on the provision of local public services like schooling, health care, transportation, waste management, police services, etc. In relation to the concept of public value capture, this means that property value increases resulting from this spending by the community belongs to the community as responsible for it (MacIntyre, 1984; Christman, 1994; Krueckeberg, 1995). Property rents will increase as a result of invested property tax income in public services (Rosen, 1982). The construction industry due to a higher property tax will decrease returns and the supply of new houses which can increase the value of the property. Property taxes on land improvements such as residential housing may be shifted forward because the relative benefits of infrastructure development are better reflected in property values than in land values (Hyman, Pasour, 1973). The classical and neo-classical theory of economic rent discuss the idea of taxing the value increase of land as a common topic (Gielen, Salas, Cuadrado, 2017).

There is an extensive body of literature that investigate the impact of property taxes on house prices as well as the impact of public spending on house prices, but there is a lack of research that deals with cross-country investigation on the relationship between property taxation, public housing investment and house prices.

This research is built on the rationale of Tiebout' hypothesis where the house price depends on the choice of the resident among different communities offering a variety of different local public services and selects the community which offers the best-suited trade-off between the property taxes and local spending program (Tiebout, 1956). Tiebout' hypothesis assumes the model, where consumer choice of location is in line with preferences for local public goods and services meaning the consumer, makes a choice and "shops" a residence in the community that offers the best local public services in accordance with property taxes.

The contribution of this research is to fill the gap in the literature by analysing the impact of property taxes and public expenditure on housing and amenities on house price dynamics across EU countries. The study aims to give answer to the following research questions: How does recurrent property tax income affect house prices? and How public spending in housing and amenities affects house prices? Quantitative research based on the Eurostat database for 26 European countries in the period 2010-2019 is performed to give answers to these research questions.

The rest of the paper is structured as follows. Section 2 reviews the literature, presenting hypotheses about the impact of property tax and public spending on housing and amenities on house prices. Section 3 discusses the data and methodology. Section 4 presents the results and Section 5 concludes.

## Literature review

Recurrent property taxes in European modern property taxes have long-standing tradition of property taxes that date back to the Middle Ages (Almy, 2014), because of their transparency, relative ease of administration, their suitability as a stable revenue source for sub-central governments and their economic efficiency. The grounds of the International organisations such as the EU and the OECD request for shifting the taxes from distortionary labour taxation to property taxation is that recurrent property taxes are usually found to be among the least detrimental taxes for economic growth (Arnold, 2008). The support to this request is that recurrent taxes at the same time respect equity objectives (Cournède, Goujard, Pina, 2013). This is particularly true for pure land taxes, as land is immobile, and its taxation is on a truly immobile base and hence does not affect decisions to work, save and invest.

In most EU member states, a joint tax on land and the building is applied (Almy, 2014), and this might impact the investment decisions. Both homeowners and businesses might be discouraged from investing if (improvement) investment results in a higher property tax liability. Among the first researchers that formally developed and tested the effect of property taxes on house prices reveals that it should be strictly negative, as long as property taxes are, at least partially, capitalized, followed by many authors (Rosen, Fullerton, 1977; Palmon, Smith, 1998). As property taxation imposes additional user costs on a property and reduces its value, consequently under full capitalization, differences in home prices are equal to the present discounted value of variations in expected property tax liabilities.

What is important for recurrent property taxes is that in most member states they are not levied on recent up-to date market values but on outdated cadastral values and are sometimes area based (Almy, 2014; Lindén, Gayer, 2012; Blöchliger, 2015). The non-reflection of market values of property limits the risk of under-investment and stabilizes property tax revenues for member states. Based on this practice of recurrent property taxation and previous literature we propose the following hypothesis: H1: Increased recurrent property tax income is negatively related to house prices.

Property tax revenue should benefit the areas it is collected from – and thus most benefit those who pay the most: in this 'benefit tax' view, property taxes amount to an indirect payment for local public services (Prichard, 2017). The author discuss that more taxes are payed, the more services should be received or in practical terms, this could mean that property tax rates are higher for properties that have access to better services: electricity, piped water, paved roads, higher quality sanitation and alike. Alternatively, it could lead wealthier households to demand that public service spending be concentrated where they live and pay taxes. Property tax revenue should be used to benefit the broader community and property taxes are a tax on a specific type of wealth, which can be used to support the overall spending needs of the community (Prichard, 2017). Accordingly, it means that those who pay more property taxes should not necessarily expect a greater share of public spending. Instead, property taxes can be used to fund the broad costs of government, and to support redistribution through broad-based spending (Zebong, Fish, Prichard, 2017). The well-established fact is that urban land is valued primarily for its location and access to various amenities. These are among the first attempts to explore the relationship between house price dynamics and local amenities. Amenity indices provide an aggregate measure of the attributes important to consumer and firm location decisions (Albouy, Lue, 2015), so that can be conducted a series of econometric analyses to formally test the relationship between local amenities and house price dynamics. Overall, the collective results from the study suggest that the desirability of a city from the perspective of both homeowners and firms is a significant channel through which land values drive house price dynamics. The findings of the prior studies will be used as the base for the hypothesis to be tested, namely: H2: Increased public investment in housing and amenities is positively related to house prices.

## Data and methods

### Data

To investigate the effect of property tax income and public expenditure in housing and amenities on house prices, the country-level data extracted from Eurostat database was used. Yearly data for 26 European countries (Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, France, Germany, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and Sweden), was structured in a balanced panel for the period from 2010 to 2019. The variable of interest is the real house price index (HPI, Annual average index, 2010=100), which is the house price index deflated by the national accounts' deflator for private final consumption expenditure. This index captures price changes of all residential properties purchased by households (flats, detached houses, terraced houses, etc.), both new and existing, independently of their final use and their previous owners (Eurostat, 2022). To empirically test the factors affecting property price the most, the following explanatory variables are used: revenue generated by general government taxes on land, buildings and general government expenditure in housing and community, GDP per capita, working age population, and total fiscal revenues as a percentage of GDP. All variables (except the last two, which are given in %), are expressed in natural logarithms, so their estimates are interpreted as elasticities. Eurostat collects data on general government expenditure by economic function according to the international Classification of the Functions of Government (COFOG) and our variable 'housing and community amenities', consists of 11 level groups data are

collected: 'housing development', 'community development', 'water supply', 'street lighting', 'R&D housing and community amenities'. Table 1 lists variables, labels, and their sources.

Table 1 Data variables, labels and sources

Variable	Label	Description	Source, Eurostat 2022
House price index	LnHPI	House price index, Annual average index, 2010=100,	annual data [prc_hpi_a]
Taxes on land, buildings and other structures, Recurrent tax	LnTLB	General government, Million euro,	[gov_10a_taxag]
Housing and community amenities spending	LnEXHA	General government expenditure by function, Million euro	(COFOG) [gov_10a_exp]
GDP per Capita	LnGDPpcE	Current prices, euro per capita	[nama_10_pc]
Total receipts from taxes and social contributions (including imputed social contributions) after deduction of amounts assessed but unlikely to be collected	TTAX%GDP	Percentage of gross domestic product (GDP), General government	[gov_10a_taxag]
Active population age 20-64	AP%	Persons in the labour force (former name: active persons, Percentage of total population	[lfsq_aged]

Table 2 Descriptive statistics

	LnHPI	LnEXHA	LnTLB	LnGDPpcE	TTAX%GDP	AP%
Mean	4.69	6.98	6.80	10.07	36.53	77.49
Median	4.64	7.01	6.58	10.05	36.30	78.55
Maximum	5.33	10.27	11.06	11.52	50.30	90.30
Minimum	4.27	3.68	3.30	8.53	22.60	61.50
Std. Dev.	0.20	1.44	1.94	0.69	6.18	5.31
Observations	260	260	260	260	260	260

Source: Authors' computations.

The descriptive statistics of the variables used to assess the effect of property tax income and expenditure in housing and community amenities on real house prices, and control variables, current GDP per capita, active population aged 20-64 as percentage of total population and total fiscal taxes as percentage of the GDP is presented in Table 2.

## Method

Compared to purely cross-sectional data, panels are attractive since they often contain far more information than a single cross-section and thus allow for an increased precision in estimation. Unfortunately, actual information of macro panels is often overstated, since that, kind of data is likely to exhibit all sorts of cross-sectional and temporal dependencies. Therefore, erroneously ignoring possible correlation of regression disturbances over time and between subjects can lead to biased statistical inference.

Modified Wald test for group-wise heteroscedasticity in fixed effect regression model was performed to test the null hypothesis of homoskedasticity, and since the

null hypothesis was rejected ( $\chi^2(26) = 793.02$ ,  $\text{Prob} > \chi^2 = 0.0000$ ), the presence of heteroskedasticity in the baseline fixed effects model was found.

Since it is known that cross-sectional dependence is more of an issue in macro panels than in micro panels, Pasaran CD (cross-sectional independence) test was performed in order to inspect whether the residuals are correlated across entities (countries). Cross-sectional dependence can lead to bias in tests results (also called contemporaneous correlation). The null hypothesis is that residuals are not correlated, and according to the results (Pesaran's test of cross-sectional independence = 5.860,  $\text{Pr} = 0.0000$ , Average absolute value of the off-diagonal elements = 0.563) the null hypothesis of no correlation was rejected and it was concluded that there is a problem of cross-sectional dependence. Taking in the account that heteroskedasticity and a cross-sectional dependence problem was present, the estimation strategy was to use fixed effects regression model with Driscoll and Kraay standard errors. Unlike standard techniques, Driscoll and Kraay algorithm accounts for cross-sectional dependence which results in a consistent and robust estimated standard error (Driscoll, Kraay, 1998).

Besides being heteroscedasticity consistent, these standard error estimates are robust to very general forms of cross-sectional and temporal dependence. The baseline empirical model is the following:

$\ln HPI_{it} = \beta_0 + \beta_1 \ln TLB_{it} + \beta_2 \ln EXHA_{it} + \beta_3 \ln GDP_{it} + \beta_4 AP\%_{it} + \beta_6 TTAX\%GDP_{it} + \varepsilon_{it}$  (1)  
 where:  $i$  is country and  $t$  is the time,  $\ln HPI_{it}$  is natural logarithm of house price index,  $\ln TLB_{it}$  is natural logarithm of Taxes on land, buildings and other structures,  $\ln EXHA_{it}$  denotes natural logarithm of Expenditure in housing and community amenities,  $\ln GDP_{it}$  denotes natural logarithm of Gross domestic product per capita in Euro,  $AP\%_{it}$  denotes active population as percentage of total and  $TT\%GDP_{it}$  denotes Total receipts from taxes and social contributions as a percentage of GDP.

## Empirical analysis and results

The output of fixed-effects regressions with Driscoll-Kraay standard errors is presented in Table 3. The estimated panel regressions appear to fit the data rather well since  $R\text{-squared} = 0.64$  and  $F(5, 25) = 2483.62$ ,  $\text{Prob} > F = 0.0000$ .

Table 3 Estimation results of panel regression using Driscoll-Kraay standard errors

lnHPI	Coef.	Std. Err.	t	P> t	[95% Conf.Interval]	
lnTLB	-0.017	0.049	-0.34	0.734	-0.119	0.085
lnEXHA	0.132	0.041	3.22	0.004	0.047	0.217
lnGDP	0.627	0.051	12.23	0.000	0.522	0.733
AP%	0.005	0.004	3.46	0.002	0.006	0.024
TTAX%GDP	0.005	0.003	1.99	0.058	-0.001	0.011
_cons	-3.796	0.495	-7.67	0.000	-4.816	-2.776

Note: Method: Fixed-effects panel regression, Number of obs = 260, Number of groups = 26.  
 Source: Authors' computations

According to the presented results, the elasticity of taxes on land, buildings and other structures on property price is not statistically significant with a negative coefficient. Furthermore, elasticity of Housing and community amenities to changes in property price is statistically significant and positive, with the coefficient of 0.13. Elasticity of Gross domestic product per capita to changes in property price is statistically significant and positive with the largest coefficient being 0.63. According to our model, the elasticity of total receipts from taxes and social contributions on changes in property price is statistically significant on 10 % significance level with

positive but very small coefficient (0.005). Finally, the labour force (active population) has a positive and statistically significant, but also small (0.005) impact on changes in property price.

## Conclusion

Public value capture is an issue of interest in many countries due to the precarious financial situation and it is an essential method of responsible land management to improve the refinancing of public infrastructure. Recurrent taxes on real-estate property as an indirect model for the absorption of the surplus value of developed land have attracted increasing attention from policymakers. The main reason of this is that property taxes in many countries are low and can serve as a potential source for increasing the fiscal income, while at the same time they are considered to be the least detrimental to economic growth given the immobility of the tax base. In addition, the tax base in most countries is determined by property cadastral values rather than market evaluations, so the value in property tax income mostly contain the changes in tax rates or in the administrative cadastral base. In this research, balanced panel data for 26 European countries is used to estimate both the effect of fiscal e.g. income of recurrent tax on land and buildings, and public investment policies e.g. expenditure on housing and community amenities, on house prices. The relevance of this issue lies in the fact that it has not been addressed before in this context considering fiscal and spending effect on house prices, cross-country in European Union. The Driscoll-Kraay standard errors regression model is used to test the a priori expected direction, that increases in tax revenue on land and buildings had negative effect, while public spending on housing and amenities had a positive effect on house prices. The estimated coefficients showed the expected sign: the public expenditure on housing and community amenities has a positive effect and taxes on land and buildings income has a negative effect on house prices. Therefore, it seems that there is empirical evidence that public spending in housing and community amenities has statistically significant although small (around 0.13) effect on house prices, while the fiscal estimate is nor statistically significant, nor economically important predictor of house prices. Additionally, as control variables: GDP per capita, active population aged 20-64, and total taxes as percentage of GDP were included in the model. The results showed that GDP per capita is statistically significant predictor of house prices with positive coefficient of 0.63, while active population showed statistically significant but small positive coefficient and total taxes showed to be statistically significant on 10% significance level with positive but small coefficient. The estimation of the effect of public spending on housing and amenities on housing values (due to the improvement of the location characteristics of houses) showed that individuals are willing to pay more if public spending on housing (which can be derived from recurrent property taxes) is increased.

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