WORKING PAPER NO. 444

House Prices and Immovable Property Taxes: Evidence from OECD Countries

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House Prices and Immovable Property Taxes: Evidence from OECD Countries

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Abstract
In this paper we study the impact of changes in immovable property taxation on the growth rate of house prices by analyzing a panel of 34 OECD countries over the period 1970-2014. We show that there is a negative relationship, robust to the inclusion of other cyclical determinants of house prices, country and year fixed effects. Furthermore, we do not find evidence of a stabilizing role of immovable property taxes on the variability of house prices: boom-bust cycles in housing markets are, in fact, not correlated with the levels of such a tax.

Keywords: House prices, Immovable property tax.

JEL Classification: E62, H20, R21, R31.

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1 Introduction

Starting from Barro (1990), a well-established result of the growth theory is that fiscal structures favoring non-distortionary forms of taxation and productive public spending are growth-enhancing. Based on this argument, several observers, scholars and international institutions like the OECD (2010), the International Monetary Fund (Norregaard, 2013) and Eurostat (2014) have recently advocated property taxes as a non-distortionary form of taxation for investment and labor choices, an efficient and equitable fiscal remedy to public deficits (Presbitero *et al.*, 2014), and as a stimulus to economic recovery after the global financial crisis of 2007-08.[1]

However, empirical evidence on the impact of property taxes on GDP growth and other aggregate fiscal variables in developed countries is at the very least mixed. Kneller *et al.* (1999) find that the total share of property taxes, social security contributions and taxes on the payroll and on manpower considered as a whole has a negative impact on the GDP per capita growth rates of 22 OECD countries during 1970-1995. Widmalm (2001) focuses on the contribution of property taxation alone, finding that the negative impact of such taxes on GDP growth rates is not robust to an extreme bounds analysis. Recently, Arnold *et al.* (2011) reexamined the link between the structure of tax revenues and GDP per capita in advanced economies, documenting that a tax structure with a higher share of property tax revenues on total revenues (in particular recurrent taxes on immovable items) increased the long-run GDP per capita for a sample of 21 OECD countries during 1970-2004. Xing (2012), however, shows that this result is not robust to the estimation methodology and that the contribution of property taxes to GDP in the long run is significantly positive only for a few countries, i.e. Finland, Ireland and the United Kingdom. Similarly, mixed results are obtained by Helms (1985), Ojede and Yamarik (2012) and Adkisson and Mohammed (2014) for the case of the US states.

Overall, this literature suggests that there are mechanisms that may counterbalance the benefits of a shift in the tax structure toward property taxes, producing adverse effects on aggregate economic activity and GDP per capita. One of such potential negative effect of property taxes comes via the real estate market. To the extent that a greater recourse to property taxes is associated with a lower average value of properties, the consequent negative wealth effects may adversely influence aggregate consumption, access to credit, investment (Campbell and Cocco, 2007; Chaney *et al.*, 2012; Adelino *et al.*, 2015), and aggregate growth.

The incidence of property taxes on house prices has always been a highly controversial issue (Netzer, 1966). According to the property tax capitalization hypothesis, a house

[1] Recurrent taxes on real estate property – according to the Eurostat (2014, p. 44) report on *Taxation trends in the European Union* – have attracted increasing attention from policy makers because in many countries where they are low they offer a potential source for increasing revenue, while at the same time they are considered to be the least detrimental to economic growth given the immobility of the tax base.

has to be considered like any other asset whose price in equilibrium is equal to the present value of the after-tax flow of rents from owning it (Poterba, 1984). Within this framework, changes in property tax liabilities are directly capitalized into changes in house prices. However, changes in property taxes are often accompanied by changes in the provision of local public services (e.g., schooling, health care, transportation, waste management, police services, etc.) funded by this form of taxation, causing an increase in the local property rents (Oates, 1969; Rosen, 1982; Bai *et al.*, 2014; Kang *et al.*, 2015). In addition, a higher tax on property reduces returns in the construction industry and the supply of new houses. In such cases, an increase in property taxes can be associated with an increase in the value of property.

While there is an extensive empirical literature on the incidence of property taxes on property values at local level for single countries (especially the United States), surprisingly enough, cross-country studies on the determinants of house prices have largely ignored the role of property taxes (Tsatsaronis and Zhu, 2004; Egert and Mihaljek, 2007; Andrews *et al.*, 2011).

In this paper, we contribute to fill this gap and analyze the link between immovable property tax revenues and house price indices in a sample of 34 OECD countries over the period 1970-2014. Our main finding is a negative correlation between annual changes in immovable property tax revenues and growth rates in aggregate house prices. This result is robust to the inclusion of control variables for changes in fundamentals, country and time fixed effects. In addition, the estimated negative relationship between property tax revenues and house prices holds, and is even more significantly, when we isolate the episodes/years in which the changes in property tax revenues can be more confidently ascribed to fiscal reforms – e.g., changes in tax rates – rather than other factors such as endogenous changes in the tax base due to changes in housing market values.

Finally, we check for the possibility that the slowing house price inflation which is observed in periods of increasing property tax revenues reflects the use of this form of taxation as a policy tool to mitigate the frequency of housing bubbles, without finding any statistically significant effects.

The paper is structured as follows. Section 2 provides a brief description of the data used for the immovable property tax and the house price index in our sample. Section 3 lays out the econometric model and shows the main empirical results. Robustness checks are provided in Section 4. Finally, concluding remarks are made in Section 5.

2 Data

The analysis draws on the house price index reported in the OECD housing prices database. This index is mainly based on the series of sales of newly-built and existing residential dwellings for all types of dwellings and is collected by the OECD, with the primary source being national central banks. The database contains country-level indexes for the 34 OECD countries from 1970 (base year 2010).[2] We use the real house price index, which results from the nominal series deflated using the private consumption deflator from the national account statistics.

Following the standard international tax classifications, we consider a specific component of the property tax, which is the recurrent tax on the value or size of immovable property. It mainly consists of regular annual levies on land or buildings – residential or commercial – and of taxes on property transactions, and represents two-thirds of the whole property tax in the EU. Within the immovable tax component, households constitute the largest group of taxpayers (with respect to businesses).

Our empirical analysis is based on the total immovable property taxes referring to all tiers of government as computed by OECD Revenue Statistics. In our sample, revenues from recurrent taxes on immovable property are, on average, about 3% of total tax revenues, although the reliance on such form of taxation varies considerably across countries. Figure 1 shows that the median value of immovable property tax over total revenues has been rising in recent years.[3]

Insert Figure 1 here

Table 1 shows the descriptive statistics and the data source for the variables that are used in the empirical analysis. The mean log difference of the house price index is 0.01, meaning that the average annual growth rate of house prices is about 1%, with a standard deviation of 0.07, while property tax revenues have an average growth rate of about 9%, with a standard deviation of 21%.

Insert Table 1 here

Other variables taken into consideration in our subsequent regression analysis are: real GDP per capita, working age population, total fiscal revenues and the long-term interest rate. For these variables we report in table 1 both the changes (Panel A) and the levels (Panel B) as they will be employed in the empirical analysis below.

[2]Our sample includes: Australia, Austria, Belgium, Canada, Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom and United States. Data for some Eastern European countries are mostly available only for recent years.

[3]For example, Italy in 2012 introduced a new property tax system that resulted in significantly higher revenues. Similarly, Hungary introduced a property tax in 2010 applied to real estate, water and airborne vehicles, and high-powered passenger cars, and Ireland introduced a new market-value-based property tax in 2012 as part of a broader fiscal package reform.

3 The empirical analysis

In order to assess the impact of changes in immovable property tax on house prices we estimate the following regression model:

$$\Delta log(HOUSE\ PRICE)_{it} = \alpha + \beta \cdot \Delta log(IMM\ TAX\ REV)_{it} + \gamma \cdot \Delta X_{it} + \lambda_i + \tau_t + \epsilon_{it} \quad (1)$$

where i denotes the country and t the year; $\Delta log(HOUSE\ PRICE)$ is the log-difference of the house price index; $\Delta log(IMM\ TAX\ REV)$ is the log-difference of immovable property tax revenues. We estimate the model in first differences in order to ensure greater comparability of the dependent variable across countries. Indeed, while cross-sectional differences in the house price index are difficult to interpret economically, differences among countries in the annual growth rates of house prices provide a more uniform metric. Moreover, we use first differences as the house price series are usually not stationary in levels (see also Egert and Mihaljek, 2007) and they have a non-stochastic trend.[4]

We further include country fixed-effects (λ_i), in order to control for country-specific unobserved factors which can persistently affect the growth rate of house prices, and year fixed-effect (τ_t) to control for aggregate shocks common to all countries on the housing market like the global financial crisis. Given that governments tend to increase immovable property taxes especially during economic downturns for fiscal budget needs, we include a dummy variable $RECESSION$ which takes the value of 1 in all years when the annual growth rate of GDP per capita is negative. This variable avoids the estimate of the negative relation between growth rates in immovable property tax rates and deflation in aggregate house prices being confounded by cyclical fluctuations in economic activity.

We further add as controls: changes in the real long-term interest rate to take into account changes in monetary policy, which may be correlated with changes in property taxes and may ultimately affect house prices (e.g., Egert and Mihaljek, 2007); changes in the working age population to control for demographic developments as well as labor market factors which normally influence the demand for housing; and the log differences in total tax revenues to control for the fact that changes in immovable property tax may occur at the same time as changes in other taxation items, which may in turn affect house prices.

We present the results in Table 2 using the whole sample. Column (1) reports the estimated coefficient on $\Delta IMMOVABLE\ TAX$ in a parsimonious specification that only controls for country and year fixed-effects, showing that it is negative and statistically significant. More precisely, an increase of 1 percentage point in the growth rate of immovable

[4]The results of the panel unit root tests by Im *et al.* (2003), allowing for cross-country heterogeneity, indicate that the series are integrated of order one and stationary in first differences (results are available upon request).

property tax revenues is associated with a decrease in the growth rate of house prices of about 0.02 percentage points. Columns (2) to (5) show the estimation results for different specifications which include the previously described additional regressors. The magnitude and statistical significance of the estimated coefficient on $\Delta IMMOVABLE\,TAX$ is highly stable across all specifications and provides evidence in favor of the capitalization hypothesis also in a cross-country analysis. Note that the coefficients and the relative standard deviations in Column (5) are less precisely estimated. This is related to the decrease in the total number of observations due to the inclusion of the change in interest rate as an additional control with respect to other columns.

Insert Table 2 here

4 Additional results

4.1 The role of fiscal reforms

A possible concern in our analysis is that changes in property tax revenues may reflect changes in tax rates and/or in the tax base, and that the latter can vary endogenously with house prices. However, to the extent that the tax base in most countries is determined by property cadastral values rather than market evaluations (Kelly, 2013; Norregaard, 2013), we can confidently assume that observed annual changes in revenues mostly reflect changes in tax rates or in the administrative cadastral base. Moreover, using tax revenues helps overcoming the issue of evaluating cross-country differences in tax exemption regimes, which can generate severe errors in the measurement of the effective tax rates.

In order to provide more compelling evidence for the impact of immovable property taxation on house prices, we isolate the years when the increase in property tax revenues is mainly due to fiscal reforms (e.g., changes in the tax regime and property tax rates or changes in the tax regimes) rather than to endogenous changes in the tax base driven by changes in market values of housing.

Specifically, we build a dummy variable ($INCREASE\ IN\ TAX$) which takes the value of one in years in which the annual change in property revenues is higher than the country-specific average in property tax revenues plus its standard deviation multiplied by a parameter.[5] Symmetrically, we define another dummy variable ($DECREASE\,IN\,TAX$) which takes the value of one when the yearly change is lower than the above-described threshold.[6]

[5]The parameter was set at 0.5. This value was chosen to include in our episodes of policy reforms some documented episodes of increases in property tax rates such as the case of Portugal in 1989 or Finland in 1992.

[6]Although the purpose here is to identify tax policy regime shifts related to tax rate changes, extraordinary yearly changes in property tax revenues may also identify abnormal changes in the tax base due to adjustments of the cadastral values. Such episodes may however be classified as episodes related

We replicate the analysis in equation (1) by changing the measure of our main independent variable of interest, where all remaining controls are unchanged:

$$\begin{aligned} \Delta log(HOUSE\ PRICE)_{it} = \alpha_1 &+ \beta_1 \cdot INCREASE\ IN\ TAX_{it} \\ &+ \beta_2 \cdot DECREASE\ IN\ TAX_{it} \\ &+ \gamma \cdot X_{it} + \lambda_i + \tau_t + \epsilon_{it} \end{aligned} \tag{2}$$

Estimation results in Table 3 show that jumps (decreases) in immovable property tax revenues are systematically related to an average decrease (increase) in house price growth rates of about 2 percentage points (of about 3-4 percentage points). Interestingly, estimation results are quite similar across all specifications and inclusions of additional controls from Column (2) to (5).

Insert Table 3

4.2 Boom-bust cycles in the housing market

Our findings so far show that increases in the immovable property tax revenues are systematically related to deflation in house prices. This can be the desired effect of using this tax as a policy tool to mitigate the likelihood of boom-bust cycle in the housing market.

Boom and bust episodes correspond to periods of extreme variability in house prices. In what follows, we rely on Bordo and Jeanne (2002) and define boom and bust episodes by comparing the three-year moving average of the annual growth rate in house prices with the long-run historical average and standard deviation.[7] Then we build a binary variable (*BOOM BUST*) that takes the value one in years characterized by either boom or bust and zero otherwise, and estimate the following linear probability model:

$$\begin{aligned} BOOM\ BUST_{it} = \alpha_1 &+ \beta_1 \cdot IMMOVABLE\ TAX_{it} \\ &+ \gamma \cdot X_{it} + \lambda_i + \tau_t + \epsilon_{it} \end{aligned} \tag{3}$$

to a policy decision to increase the tax pressure on immovable properties and hence represent relevant variations for assessing the impact of a change in the immovable property taxation.

[7] Consider the annual growth rate of house prices for each county i: $g_{i,t} = log(P_{i,t}) - log(P_{i,t-1})$. Take the three years moving average: $mai, t = \frac{g_{i,t}+g_{i,t-1}+g_{i,t-2}}{3}$. In each year and for each country we consider the year t to be the peak of a boom if $mai, t > g + tv$ where g and v are respectively the average and the standard deviation of the annual growth rates over all countries; t is a parameter to be calibrated. Conversely, we consider a year t to be the (negative) peak of a bust if $mai, t < g - tv$. After defining the peaks of boom and bust, we define as a boom episode the time window that spans the two years that proceeded the peak to the year of the peak itself (i.e. if t is the peak of a boom/bust episode, $t-2$, $t-1$ and t are considered the boom/bust time window). In the current estimation, we set the parameter t equal to 0.6. This parametrization is chosen so as to include the recent boom-bust episodes around 2007 in the USA and UK in our definition. As a robustness check we consider parameter values of 0.5 and 0.7. The following empirical results are unchanged with such different parameter values.

where the $IMMOVABLE\,TAX$ variable is the level of immovable property tax revenues over GDP and, coherently, all the other explanatory variables are also expressed in levels.[8]

Insert Table 4

Table 4 reports the estimates from the regression model in equation (3). Estimation results reveal that boom-bust cycles are not systematically related to variations in the immovable property tax revenues, suggesting that immovable property taxation has not been used by governments as a strategic policy tool to cool down the housing market in the years it was overheating.

5 Conclusions

While the immovable property tax accounts for low levels of total tax revenues and GDP in most developed and developing countries (Almy, 2014), it has been recently advocated as a policy tool by policy makers and scholars. Given its role in the current policy debate, it is important to study possible drawbacks arising from a shift toward this type of tax in recent macroeconomic contexts. In this paper we showed that countries that experienced an increase in the immovable property tax also experienced significant deflation in the national housing market. While we do not take a stance on the possible welfare effects associated to higher property taxation and lower house prices, our cross-country evidence suggests that the possible distortionary effects of this tax for such an important market as the housing market should not be neglected in evaluating the overall impact of changes in property taxes on the aggregate economy.

[8] The dummy *Recession* has been replaced by the log(GDP per capita).

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A Figures

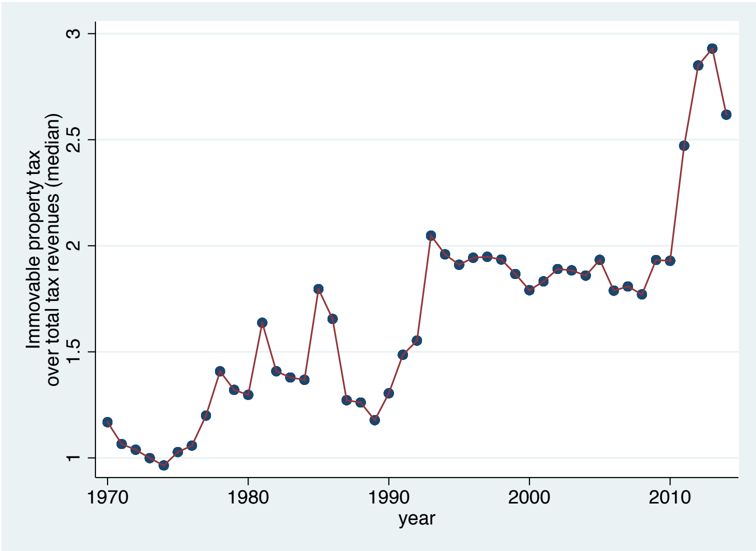

Figure 1: *Median value of immovable property tax over total tax revenues*

B Tables

Table 1: Descriptive statistics

Variable	Mean	St. Dev.	N.Obs.	Source
	Panel A: Variables in changes			
Log change in real house prices	0.01	0.07	973	OECD
Log change in property tax revenues	0.09	0.21	1123	OECD
Log change in real GDP pc	0.05	0.08	1171	OECD
Recession	0.09	0.29	1205	OECD
Log change in working age population	0.08	0.28	1159	OECD
Log change in total tax revenues	0.09	0.10	1170	OECD
Change in real interest rates	-0.21	1.14	883	OECD
	Panel B: Variables in levels			
Boom-Bust real house prices	0.07	0.26	905	OECD
Property tax revenues over GDP	0.96	0.93	1205	OECD
Log GDP pc	-12.59	1.88	1205	OECD
Log working age population	4.19	0.04	1193	OECD
Log total tax revenues	5.09	2.62	1204	OECD
Real interest rate	6.55	3.38	915	OECD

The table provides summary statistics for our sample of 34 countries. All the series for real house prices, real GDP per capita, property tax revenues, total revenues, working age population, and the real long-term interest rate are from the OECD. Panel A shows the descriptive statistics for the variables expressed in changes while Panel B shows variables expressed in levels. Recession is a dummy variable which takes the value of 1 in years when a country is experiencing a negative growth of GDP per capita. Boom-Bust in real house prices is a dummy variable equal to 1 in years when a country is experiencing abnormal rate of inflation (boom) or deflation (bust) in real house prices.

Table 2: Regression results from the estimation of equation 1

	Log change in real house prices				
Log change in property tax revenues	-0.021**	-0.022**	-0.023**	-0.022**	-0.026*
	(0.009)	(0.009)	(0.009)	(0.011)	(0.014)
Recession		-0.022**	-0.020*	-0.012	-0.012
		(0.010)	(0.010)	(0.010)	(0.009)
Log change in working age population			0.046***	0.043***	0.054***
			(0.014)	(0.013)	(0.015)
Log change in total tax revenues				0.412***	0.362***
				(0.079)	(0.100)
Change in real interest rates					-0.001
					(0.004)
Constant	0.018	0.017	0.019	-0.034*	-0.025
	(0.012)	(0.012)	(0.012)	(0.017)	(0.021)
Observations	956	956	944	944	802
Adjusted R^2	0.189	0.195	0.209	0.271	0.305
Year and Country Fixed Effects	Y	Y	Y	Y	Y

Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 3: Regression results from the estimation of equation 2

	Log change in real house prices				
Increase in property tax revenues	-0.020**	-0.021**	-0.024***	-0.026***	-0.025***
	(0.008)	(0.008)	(0.008)	(0.007)	(0.009)
Decrease in property tax revenues	0.040***	0.043***	0.046***	0.019**	0.0
	(0.005)	(0.005)	(0.005)	(0.008)	(.)
Recession		-0.022**	-0.019*	-0.012	-0.012
		(0.010)	(0.009)	(0.010)	(0.009)
Log change in working age population			0.056***	0.051***	0.062***
			(0.014)	(0.013)	(0.014)
Log change in total tax revenues				0.421***	0.385***
				(0.075)	(0.095)
Change in real interest rates					-0.000
					(0.004)
Constant	0.074***	0.074***	0.068***	-0.003	0.005
	(0.019)	(0.018)	(0.018)	(0.025)	(0.036)
Observations	935	935	923	923	782
Adjusted R^2	0.198	0.204	0.223	0.286	0.322
Year and Country Fixed Effects	Y	Y	Y	Y	Y

Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 4: Regression results from the estimation of equation 3

	Boom-Bust in real house prices				
Property tax revenues over GDP	-0.047	-0.048	-0.045	-0.047	-0.036
	(0.043)	(0.043)	(0.045)	(0.043)	(0.053)
Log GDP pc		-0.041	-0.047	-0.267	-0.588***
		(0.073)	(0.081)	(0.198)	(0.175)
Log working age population			0.176	-0.625	-0.191
			(0.733)	(0.867)	(0.744)
Log total tax revenues				0.208	0.415***
				(0.157)	(0.136)
Real interest rate					0.014
					(0.010)
Constant	0.324***	-0.443	-1.079	-1.494	-8.942***
	(0.111)	(0.916)	(3.664)	(3.447)	(2.978)
Observations	905	905	893	893	773
Adjusted R^2	0.115	0.115	0.114	0.120	0.186
Year and Country Fixed Effects	Y	Y	Y	Y	Y

Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.