

Immovable property: where, why and how should it be taxed? A review of the literature and its implementation in Europe

DORIS PRAMMER, Dr.*

Article** JEL: H21, H3, H71 https://doi.org/10.3326/pse.44.4.3

Doris PRAMMER Oesterreichische Nationalbank, Otto-Wagner Platz 3, 1090 Vienna, Austria e-mail: doris.prammer@oenb.at ORCiD: 0000-0002-4855-7575

^{*} The views expressed in this paper are exclusively those of the author and do not necessarily reflect those of the OeNB or the Eurosystem. The author would like to thank two anonymous referees, Walpurga Koehler-Toeglhofer, Lukas Reiss, Kilian Rieder and Martin Schneider for valuable suggestions and discussions.

^{**} Received: January 13, 2020 Accepted: September 7, 2020

Abstract

This paper surveys the literature on immovable property taxation along two dimensions prevalent in the literature: i) according to the type of real estate over its life-cycle and ii) according to the type of tax. The first strand of the literature agrees that immovable property taxation should be neutral to avoid distortionary behaviour vis-a-vis other assets/consumption goods. However, the neutrality benchmark and hence taxation to be chosen depend on the theoretical view taken. The second strand assesses one type of property tax at a single point in time with respect to the considerations of efficiency, equity, fiscal federalism and political economy. Most of this strand of the literature focuses on recurrent property taxation on residential property, which has a lot of theoretical merits. A key message of both strands is that reaping the theoretical merits of immovable property taxation in practice is hindered by tax design issues and political economy issues.

Keywords: immovable property taxation, recurrent property tax, owner-occupied housing

1 INTRODUCTION

Immovable property has been taxed since the Middle Ages (Almy, 2013), which explains its long tradition in public finance. Public finance economists have analysed the taxation of immovable property with respect to the considerations of efficiency, effectiveness, equality, budgetary and political economy. Recently, the analysis has been extended to assess its fit as a macroprudential policy tool to affect the housing market, given the role of the housing market in the wake of the economic and financial crisis (Kuttner and Shim, 2013; ESRB, 2015; Fatica, 2015). Furthermore, international institutions such as the European Commission and the OECD seem to prefer immovable property taxation over other forms of taxation, as they keep requesting a tax shift from labour to immovable property taxation.¹

The goal of this paper is to provide a non-technical overview of the most relevant aspects of immovable property taxation found in the literature and applied in Europe. The large amount of literature on the tax treatment of immovable property is classified along new dimensions. The paper innovatively reviews the literature on immovable property taxation along two lines: The first review category comprises literature that deals with the taxation of specific property items over their whole life-cycle, such as the taxation of owner-occupied housing. It highlights the distortions property taxation introduces to housing investment and consumption decisions compared to other assets/consumption goods. The second category considers the literature that assesses the vices and virtues of one particular tax on immovable property (at one particular point in the life-cycle), such as recurrent

¹ The economic argumentation was laid down in Annex IV of the AGS 2012 (EC, 2011). Since then different member states have received the country specific recommendation to shift taxes away from labour to (recurrent) property taxation; e.g. AT in 2013 and 2014. The OECD recommends this shift in its country reports, e.g. for AT in 2017.

property taxation. The paper hence gives a systematic overview of the literature on immovable property taxation according to either i) the type of real estate or ii) the type of tax, highlighting the most important findings in the two different strands of the literature. Moreover, it also describes some of the key features of housing taxation in the EU.

The focus of the survey on distortionary and efficiency considerations of immovable property taxation follows directly from the available literature. Other aspects such as equity, fiscal federalism and political economy considerations, while present over a long time, have attracted less attention. Moreover, as empirical literature on housing taxation is scarce in Europe, empirical results throughout the paper also refer to the US, which serves as an indicator of the order of magnitude for Europe.

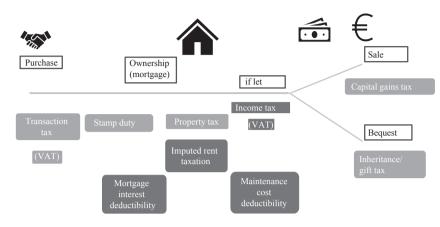
The paper is structured in three main parts. Section 2 serves as an introduction to the topic: it recalls all taxes that are possibly levied on immovable property and defines the terminology used in the remainder of the paper. Moreover, it also discusses briefly the current use and design of these taxes in EU member states. Sections 3 and 4 review the main economic arguments and empirical results in the literature: Following the two different strands identified, section 3 deals with the taxation according to the type of real estate over its life-cycle, while section 4 provides an overview of the literature according to the specific type of immovable property tax. Section 5 concludes. A key message is that while literature attributes a lot of theoretical merits to immovable property taxation, practical tax design issues and considerations of political economy make it difficult to reap its merits in practice.

2 IMMOVABLE PROPERTY: WHEN/WHERE/HOW IS IT TAXED IN THE EU?

Before classifying the literature on immovable property taxation, a natural starting point is to recall where in its life-cycle immovable property is actually subject to which kind of tax. Graph 1 gives an overview of the most common immovable property taxes applied in the EU over the object's life-cycle. It starts with taxes due at first purchase for an owner, ending with the object's transfer to a new owner, when the object's life-cycle – and tax liabilities – starts again. Taxes generally falling on stock variables are denoted by solid frames, while those on flow variables are represented by dashed frames in Graph 1.

FIGURE 1

Taxation of immovable property over its life-cycle



Source: Own representation.

2.1 TAXES ON THE PURCHASE OF IMMOVABLE PROPERTY

The purchase of immovable property is subject to a property transfer tax in almost all EU member states (exceptions EE, LT, SK). As indicated by the solid frame in Figure 1, this tax is usually based on a stock, namely the value of the property, typically measured by (some share of) the transaction price. Maximum statutory tax rates reach up to 12.5% of the transaction price, as in Belgium (see Table 1), with various exemptions and deductions for first time buyers, permanent residences or small/inexpensive property. New buildings are subject to VAT based on the transaction price in most EU member states, which sometimes replaces the property transfer tax (Italy, Cyprus, Slovenia, Poland, Spain). In addition, all EU member states levy some kind of stamp duty linked to the legal recognition of the immovable property transfer and its registration. This stamp duty is either levied as a (low) percentage of the transaction price - in which case it presents a tax on a stock - and/or a fixed nominal amount. If the acquisition of immovable property is financed by a mortgage, the stamp duty is sometimes increased by a share of the loan value (for example, in Austria, the additional stamp duty amounts to 1.2% of the mortgage value).

486

TABLE 1

Tax rates on residential property in the euro area, in %

	Maximum statutory tax rate on residential property		Implicit tax rate	
	Property transfer	Capital gains	Recurrent property tax (tax revenues/ dwellings stock)	
Belgium	12.5	16.5	0.690	
Germany	6.0	30.0	0.130	
Estonia	no	income tax rate	no	
Ireland	2.0	30.0	0.180	
Greece	3.1	suspended	0.770	
Spain	10.0	23.0	0.340	
France	5.8	36.2	1.350	
Italy	9.0	20.0	0.410	
Cyprus	8.0	20.0	0.220	
Latvia	22.0	20.0	0.100	
Lithuania	no	income tax rate 15.0	0.080	
Luxembourg	10.5	income tax rate	0.070	
Malta	5.0	8.0	no	
Netherlands	2.0	no	0.600	
Austria	3.5	30.0	0.030	
Portugal	8.0	29.0	0.360	
Slovenia	2.0	25.0	0.160	
Slovakia	no	income tax rate	0.160	
Finland	4.0	34.0	0.290	

* Main residences are gewnerally not subject to capital gains taxation.

Source: Own representation based on National Ministries of Finance; Barrios et al. (2019) and Fatica and Prammer (2018) for implicit tax rates.

2.2 TAXES DURING THE OWNERSHIP OF IMMOVABLE PROPERTY

The ownership of an immovable property is subject to recurrent property taxes.² The basic case of a recurrent tax on residential property is a flat rate which is levied on the cadastral value³ by local authorities. Some, particularly new, member states levy surface based local property taxes (Brzeski, Románová and Franzsen, 2019). Only a few member states, namely Croatia⁴, Malta, Estonia and Italy⁵ do not levy recurrent property taxes. Despite their widespread use, the revenue from recurrent taxes on immovable property is rather low, amounting to only 1.6% of GDP in the EU on average in 2017 (EA-average: 1.3% of GDP). This is due to the use of the cadastral values as the tax base, which often fall short of up-to-date market values. Cadastral values in Germany and Austria are particularly outdated – stemming from the 1960s and 1970s, respectively.⁶ Hence, the effective

⁵ Italy does not levy recurrent property taxes on the primary residence since 2017.

PUBLIC SECTOR ECONOMICS 44 (4) 483-504 (2020

DORIS PRAMMER: IMMOVABLE PROPERTY: WHERE, WHY AND HOW SHOULD IT BE TAXED? A REVIEW OF THE LITERATURE AND IT'S IMPLEMENTATION IN EUROPI

² For the economic discussion on recurrent property taxes, the reader is referred to section 4.1.

³ The cadastral value of a property refers to the value of the land and buildings as recorded in the land register for tax purposes.

⁴ However, in Croatia a so-called 'communal fee' on properties based on its surface is levied.

⁶ Following a constitutional court ruling Germany has to adjust its cadastral values by the end of 2019.

recurrent property tax rate is well below 0.5% in the euro area (see Table 1 and Fatica and Prammer, 2018), despite the considerably higher statutory tax rates. An alternative to recurrently taxing the stock of immovable property is a tax on imputed rents. In this case a tax is levied on the fictive flow of rental income (dashed frame in Figure 1) – usually by adding it to other income categories; it is, however, currently only applied for main dwellings by the Netherlands.⁷

The case for a tax on the flow of rental income is clear cut, if the owner rents out the property and earns actual rental income. This income is subject to some kind of income taxation in all EU member states. VAT might be levied on the rent – for private rents often subject to a turnover threshold; generally private rents are subject to reduced VAT rates. If a private purchase of the immovable property is financed by a mortgage, mortgage interest rates are at least partially deductible in about 2/3 of the EU member states (Johannesson-Linden and Gayer, 2012; Fatica and Prammer, 2018).⁸

2.3 TAXES ON THE TRANSFER OF IMMOVABLE PROPERTY TO A NEW OWNER

The sale of immovable property is generally subject to a capital gains tax, where the difference between the sale and the overall purchase price (often adjusted for CPI inflation after a holding period and/or costs for major improvements of the property) is taxed in almost all EU member states (see Table 1). At the same time, those member states that tax the profits allow for generous exemptions for a main residence. Usually, capital gains on a main residence are tax exempt subject to a minimum time of tenure (2-5 years) or provided that the capital gains are reinvested in the acquisition of a new main residence (e.g. Spain). If immovable property is transferred charge-free in the case of an inheritance or gift, the transfer is subject to inheritance/gift tax in about half of the EU-member states⁹. Even if a state does not apply a general inheritance/gift tax, the cost-free transfer of immovable property might still be subject to taxation. In Austria, for example, a progressive tax – depending on the family relationship and the value of the property – is levied upon the cost-free transfer of immovable property, while there is no general inheritance/gift tax.

Having set the scene, the remainder of the paper is dedicated to reviewing the literature on immovable property taxation either i) according to the type of real estate or ii) according to the type of tax. It presents the economic arguments for the taxation of immovable property and discusses them from considerations of efficiency, equity, fiscal federalism and political economy.

⁷ According to Johannesson-Linden and Gayer (2012) FN 6, BE, ES and IT tax imputed rents only for other than main dwellings. LU taxed imputed rents until 2016 based on the cadastral value; the NL use the market value of the property as the tax base. Additional information on the calculation of imputed rent taxation for other EU countries can be found in Figari et al.(2017).

⁸ The mortgage financing of business property is usually tax deductible in all member states.

⁹ Tax bases for real estate property when bequeathed are very heterogeneous in member states and tax rates vary considerably among groups of heirs and property value.

3 TAXATION OF ONE TYPE OF REAL ESTATE OVER ITS LIVE-CYCLE

Real estate property can be produced for rent in a market by a landlord, for own consumption and investment by an owner-occupier or for a business input. These different purposes of real estate property would call – according to optimal tax theory – for different taxation. According to optimal tax theory, production taxation should not distort factor proportions in production; hence, "to achieve production efficiency, the tax on business income from housing should be made neutral" (Englund, 2003:939).

3.1 TAXING OWNER OCCUPIED HOUSING

Owner-occupied housing represents two features to its owners. First, housing usually presents the largest asset of a household, second living in a home provides a flow of services consumed by the owner. If the first view prevails, owner-occupied housing should be taxed as any other asset to achieve neutral taxation, while the second view would call for the taxation of owner-occupied housing like any other durable consumption good.

3.1.1 TAXING OWNER-OCCUPIED HOUSING AS AN ASSET

The household main residence presents on average almost 50% of total assets and more than 60% of total real assets in the euro area (HFCN, 2016). As it also presents the single largest asset in a household portfolio, literature tends to call for taxing it like any other asset under a Haig-Simons income tax scheme (e.g. Poterba and Sinai, 2008). This is to avoid distortions in the allocation of private investment and savings caused by the tax wedge on the return to different forms of capital (Berkovec and Fullerton, 1992; Gervais, 2002). For owner-occupied housing, following the user cost of capital approach, a Haig-Simons neutral income taxation translates into taxing the net return of owning a house, i.e. taxing the imputed rent (fictive rental income) as well as capital gains from selling the property while allowing for the deduction of costs, such as maintenance costs and interest payments in the case of debt-financed purchase. In practice, as stated in section 2, the current treatment of housing taxation leaves imputed rents and capital gains for primary residences mostly untaxed while allowing for mortgage interest deductibility (MID). The effects of this beneficial fiscal treatment of owner-occupied housing have been studied empirically from various angles for the US employing the user cost of capital approach: While the academic literature has reached mixed conclusions on the impact of preferential taxation of owneroccupied housing at the extensive margin - the "own vs. rent decision" (e.g. Rosen, 1979; Rosen and Rosen, 1980; Gervais, 2002; Hanson, 2012), it generally agrees that tax preferential treatment incentivises excess consumption of housingservices by home-owners at the intensive margin, i.e. with respect to housing size (e.g. Rosen 1985; Poterba, 1984; 1992, Hanson, 2012). Based on the user cost of capital approach, costs for public finances compared to the neutral benchmark have been found to range from 2.1 to 2.6 percent of overall tax revenues (e.g. Poterba and Sinai, 2008; Martin and Hanson, 2016) in the US. Given the generous MID provisions even for high incomes in the US, various studies stress the

strongly regressive distributional impact of the tax breaks for owner occupied housing (e.g. Poterba, 1992; Poterba and Sinai, 2011; Martin and Hanson, 2016). For the euro area, the few studies¹⁰ employing (variants of) the user cost of capital approach generally confirm the empirical findings for the US. For example, Fatica and Prammer (2018) show that the preferential tax treatment of owner-occupied housing reduces the user cost of housing capital by almost 40 percent compared to the efficient level under neutral taxation. The tax benefits stem mostly from the under-taxation of equity, namely the widespread tax exemption of imputed rents and capital gains. They find that these tax benefits translate into an excess consumption of housing services equivalent to about 30 percent of financial asset holdings in household portfolios. Moreover, given the regressivity of the tax preferential treatment of owner-occupied housing in most euro area states, equity could be increased by the removal of these tax breaks (e.g. Matsaganis and Flevotomou, 2007; Figari et al., 2017; Fatica and Prammer, 2018).

3.1.2 TAXING OWNER-OCCUPIED HOUSING AS A CONSUMPTION GOOD

If (owner-occupied) housing is treated as a (very) durable consumption good, then it should be subject to VAT. Hence it should be subject to (standard) VAT when new, as the price of the good - when new - should correspond to the present value of the stream of future services it provides (Mirrlees et al., 2011). Indeed, new buildings are subject to VAT in most EU member states. However, the upfront acquisition price might be a bad proxy for the stream of services for very longlived products such as housing. Hence, as indicated by the Mirrlees Review (Mirrlees et al., 2011) an annual tax related to the consumption value of the property is a more effective way of taxing housing. It accounts for changes in the value of housing services and can be applied to the existing housing stock.¹¹ Practically, recurrent property taxes or imputed rent taxation, adequately reflecting the (consumption) value of the property, would do the job efficiently.

Drawing on optimal tax theory literature, it can be said that on one hand the low price elasticity of housing would call for high taxation while on the other hand its low income elasticity – being a necessary good – suggests lower taxation (compare Englund, 2003; Albouy and Findeisen, 2016). Nevertheless, Albouy and Findeisen (2016) state that it is more efficient to tax housing higher than any other forms of consumption with tax rates being at least 50 percent higher than on other forms of consumption. According to them, two arguments, namely that housing is a substitute for taxable, market-oriented activities and that the value of housing stems from the land it is on – which presents an in inelastic base – both call for high taxation of housing deserves lower taxation because it is a necessity or because it might distort location choices impacting negatively on productivity.

490

¹⁰ For the EU and euro area, empirical studies employing the user-cost approach are scarce mostly due to data limitations.

¹¹ This is particularly important when the transition to a VAT for new housing would introduce considerable distortions between new and old housing or lead to lock-in effects if applied to all housing transfers.

3.2 TAXING RENTAL HOUSING

Rental housing presents a pure consumption good for the tenant and an investment good for the landlord. A tax system guaranteeing production efficiency in the provision of housing services should be made neutral (Englund, 2002). Hence, net profits should be taxed as business income, and capital gains tax should be levied when selling the property. Landlords generally include rents received as income and deduct expenses, such as maintenance and operating costs (both labour and capital costs), mortgage interest, and some depreciation costs. The resulting net profit should be subject to corporate income tax or personal income tax depending on the legal status of the landlord. Practical complications might, however, arise due to preferential tax treatment of debt and of double taxation issues of profits and dividends (Englund, 2002). From a consumer's point of view, taxation should not distort tenure decisions between owning and renting a house. While conventional literature points to the tax preferential treatment of owner-occupied housing (compare section 3.1) compared to rental income, Chambers, Garriga and Schlagenhauf (2009) suggest that the progressivity of income taxation can amplify or mitigate these tax asymmetries, with important implications for tenure choices.

3.3 TAXING IMMOVABLE/REAL ESTATE BUSINESS PROPERTY

While it is generally agreed that residential and business real estate property should be taxed differently, the literature on business property taxation does generally not follow the overall life-cycle of the business property. The bulk of the literature is restricted to the effect of recurrent property taxation and assesses it with respect to its implications for business competitiveness (compare section 4.1).

In general, the assessment on how (recurrent) business property taxation should be designed depends on whether one takes the "capital tax view" or the "benefit tax view".¹² The first view considers real estate property as an input factor for the business and calls for taxation in line with other input factors to avoid a misallocation of input factors. As in this view business property taxation falls on capital, thus disincentivizing investment and creating location distortions, the Mirrlees Review (Mirrlees et al., 2011) advocates non taxation of business property on efficiency grounds. Contrastingly, according to the "benefit tax view" the tax falls on land value (and benefits linked to it) making it an efficient means for raising revenues (Smart, 2013). Moreover, Blöchliger (2015) stresses the efficiency of business property taxes as an important backstop to incorporation in order to avoid the residential property tax. Empirically, businesses seem to react little to business property taxes, which supports the "benefit tax view" (Smart, 2013). Norregaard (2013) is among the few to highlight the distortive effects of transfer taxes on businesses, as these taxes impose efficiency costs through resource misallocations to the extent their incidence rests on business inputs.

¹² See Smart (2013) for a review of the literature, including the different arguments put forward depending on the "capital tax view" and "benefit tax view" respectively.

Most of the literature on immovable property taxation focuses on one specific type of tax and assesses its vices and virtues with respect to i) efficiency and effectiveness, ii) fairness/equity, iii) fiscal federalism and iv) political economy. Recurrent property tax on residential property has been in the focus of the literature, while property transfer taxes have gained more attention recently. VAT and inheritance/ gift taxation are hardly assessed with a special focus on immovable property and hence are not included in this overview.¹³

4.1 RECURRENT PROPERTY TAXES

The long-standing tradition of property taxes – modern European property taxes date back to the Middle Ages (Almy, 2013) – lies in their transparency, relative ease of administration, their suitability as a stable revenue source for sub-central governments and their economic efficiency. International organisations such as the EU and the OECD keep requesting that taxes be shifted from distortionary labour taxation to property taxation; the grounds alleged are those of efficiency and equity.¹⁴ Indeed, recurrent property taxes are usually found to be among the least detrimental taxes for economic growth (Arnold, 2008), while at the same time they respect equity objectives (Cournède, Goujard and 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. However, a joint tax on land and the building on it, as applied by most EU member states (Almy, 2013), might impact on investment decisions. Both homeowners and businesses might be discouraged from investing if (improvement) investment results in a higher property tax liability.¹⁵

However, in most member states property taxes are not levied on recent up-to date market values but on outdated cadastral values (compare section 2; Almy, 2013; Johannesson-Linden and Gayer, 2012; Blöchliger, 2015) and are sometimes areabased. The non-reflection of property values limits the risk of under-investment and moreover stabilizes property tax revenues for member states. Nevertheless, this very feature of the property tax design has been heavily criticised. First, market developments are not reflected and the tax cannot therefore contribute much to dampening the boom-and-bust-cycle of property markets and is thereby limited in

492

¹³ Given the lack of literature and the heterogenous treatment of real estate property when bequeathed, an assessment of its economic (and empirical) impacts is left for further research.

¹⁴ There is also literature assessing the impact of recurrent property taxation on urban sprawl, generally establishing a negative link between recurrent property taxes and urban sprawl (Brueckner and Kim, 2002; Song and Zenou, 2006; Banzhaf and Lavery, 2010). However, housing tax benefits such as mortgage interest deductibility (MID) seem to increase urban sprawl both in the US (Voith, 1999; Glaeser, 2011) and in Europe (for Belgium see: Xhignesse and Verbist, 2019). Nevertheless, MID can increase efficiency in location decisions as it mitigates the tax penalty of working in an area with better-paying jobs and higher house prices (Albouy and Hansen, 2014).

¹⁵ Compare the discussion of "capital tax view" vs. "benefit tax view" in section 3.3.

reducing the fluctuations in the economy.¹⁶ Second, the tax is not perceived as fair. Those made relatively wealthier by the market or enjoying more neighbourhood amenities (which should be capitalized into house prices) compared to the time when the cadastral value was set, pay the same property tax as those with stagnant property values. Moreover, the relevant literature (e.g. Wassmer, Fisher and Kuloszewski, 2019) claims that the public does not perceive recurrent property tax as progressive. However, as indicated by empirical literature "property tax can indeed be anything from progressive to regressive" (Blöchliger, 2015:15). While this conclusion rests on the exact design of the recurrent property tax applied in practice, it also hinges upon different beliefs about the incidence of property taxation. Theoretically, if property taxes are considered as a real estate tax on capital income ("capital-tax view" or "new view"), it is a progressive tax, as housing capital is generally concentrated among high income individuals. However, if it is seen as a tax on housing consumption services, it is considered regressive as the share of housing consumption expenditure in income is higher for low income households ("old-view"). The third view ("benefit view") considers recurrent property taxes as neither regressive nor progressive, as the tax represents a fee/ price for local goods and services.¹⁷ Furthermore, recurrent property taxation does not generally follow the ability-to-pay principle, which is usually considered to constitute a fair tax. A tax on the property value is not linked to current income, which makes it particularly burdensome for income-poor-housing-rich households such as senior households.

Given the practical shortcomings of the recurrent property tax, economists have repeatedly issued reform suggestions, to reap the full theoretical benefits of a recurrent property tax. Among the most frequently expressed reform necessities is the need to update the tax base to market values to increase the fairness of the tax (Norregaard, 2013; Slack and Bird, 2014; Blöchliger, 2015). The issue of equity/distributional reservations could be handled with an increase in the progressivity of the tax design e.g. by exemptions or property tax credits (based on income) for low income households or progressive tax rates. Tax deferrals for retirees would strengthen the ability to pay principle for senior households (Slack and Bird, 2015). A more radical approach has been put forward by work by the OECD¹⁸ suggesting taxing immovable property through the income tax system, *via* the taxation of imputed rents jointly with income from other sources (compare section 4.3).

While reform proposals are manifold, actual recurrent property tax reforms remain limited in number and size. This might be due to two factors: i) fiscal federalism frameworks and ii) political economy considerations. As a recurrent (residential) property tax fulfils the basic requirements for a good local tax (Oates and Schwab,

Smart (2013), Norregaard (2013) and Oates and Fischel (2016).

¹⁶ Poghosyan (2016) has found a limited dampening effect of recurrent property taxes in the US, where recurrent property taxes are levied on property market values. Oliviero et al.(2019) find a strong negative relationship between increases in immovable property tax revenues and house prices for a panel of OECD countries. ¹⁷ For details on different views on the incidence of property taxation see e.g. Fullerton and Metcalf (2002),

¹⁸ For a summary on this OECD work see Blöchliger (2015).

2004; Bird, 2011; Bird, Slack and Tassonyi, 2012) such as immobility, predictability, stability, visibility, ease of administration and non-exportability to other jurisdictions (see Table 2), it is usually devolved to sub-central governments. Hence, any changes of the property tax design impact on the sub-central tax mix resulting in the need to change inter-governmental transfer schemes as well or even the whole intergovernmental framework (Blöchliger, 2015; Norregaard, 2013). Another obstacle to property tax reforms seems to be the high transparency of the tax, which has made it "politically very unpopular" (Norregaard, 2013:33). Even if a properly designed reform alleviated some of the political economy reservations such as perceived regressivity and unfairness due to outdated market values or issues for liquidity-constrained households, the property tax remains a presumptive tax, based on estimated (market) values. As property tax is capitalized into property prices, any reform would generate winners and losers, where generally losers are more vocal, resulting in "tax revolts" (Blöchliger, 2015). Hence, Slack and Bird (2014) explain the limited appetite for property tax reforms by political considerations outweighing economic principles as stability is favoured over equity and efficiency.

TABLE 2

Properties of a good local tax

_	Recurrent property tax		Property transfer tax
	Residential property	Non-residential property	Residential property
Immobile tax base	Yes	Yes	Yes
Predictable and stable revenues	Yes	Yes	No
No tax exporting	Yes	No	Yes
Visible and accountable	Yes	No	Yes
Fair based on benefits received	Yes	No	?
Fair based on ability to pay	Yes	?	Yes
Easy to administer	Yes	No	Yes

Source: Bird (2011); Bird, Slack and Tassonyi (2012); own representation for property transfer tax.

4.2 PROPERTY TRANSFER TAXES

Even though property transfer taxes have also a long tradition (Lenoel, Matsu and Naisbitt, 2018) and tax rates can be as high as VAT rates in some countries (see Table 1), they have been heavily criticized on efficiency grounds. Norregaard (2013) and the Mirrlees et al. (2011) point out that transaction taxes discourage transactions and hence might distort the allocation of resources and hence lead to significant welfare losses.¹⁹ Indeed, empirical analysis shows that higher property transfer taxes not only decrease transactions but also lower house prices and house price growth respectively (e.g. Davidoff and Leigh, 2013; Fritzsche and Vandrei,

494

¹⁹ For a theoretical model see Buettner (2017).

2016; Berger, Turner and Zwick, 2017; Best and Kleven, 2018; Koetter, Marek and Mavropoulos, 2019). Effects seem to be stronger in rural regions than in urban areas (Koetter, Marek and Mavropoulos, 2019). Moreover, property transfer taxes might add imperfections to the labour market *via* the lock-in effect of workers. If transaction costs are high, owners are encouraged to remain in the size and location of their home, irrespective of efficiency gains by moving towards areas of excess labour demand. Several empirical studies (e.g. Van Ommeren and van Leuvensteijn, 2005; Hilber and Lyytikainen, 2017) confirm that higher transfer costs have a negative impact on labour mobility and are even linked to higher unemployment risk (De Graaf and van Leuvensteijn, 2013). Eerola et al. (2019) show that the negative impact of housing transfer taxes on household mobility is even higher when taking spillover effects between different housing market segments into account, which is generally ignored in previous studies.

However, efficiency can also be assessed from a macroprudential point of view, assessing the ability of property transfer taxes to curb house price increases and house price volatility. In addition to curbing house price growth, property transfer taxes also decrease house price volatility (Catte et al., 2004; Kuttner and Shim, 2013) – in particular if they are especially designed to prevent speculation (Hua and Craig, 2011). However, as effects seem to be small or even ambiguous, other macroprudential tools might be more effective in reducing house price swings that might ultimately stress the banking sector and the economy.

According to the fiscal federalism view, property transfer taxes could be perceived as a good local tax. They fulfil the same requirements as recurrent property taxes except that they are a bit less predictable and the revenues are a bit more volatile (compare Table 2). They are levied on an immobile base with high visibility and accountability and usually fairly based on the ability to pay. As property transfer taxes are usually levied on an ad valorem basis on the property transaction price. they are generally quite equitable. Presumably, wealthier and higher income percentiles opt for higher value houses subject to higher taxation, which makes the property transfer tax mildly progressive even in the case of flat tax rates. Clearly, depending on the exact design of the property transfer tax, it can be anything from regressive to strongly progressive. For example, the UK stamp duty is levied at higher rates on higher value houses - where the respective rate is applied to the whole purchase price. However, these kinks in the tax design might provide considerable incentives for undervaluing the property to evade taxes. The incentive for collusion between buyer and seller to evade taxes is another issue in case of high transaction costs (Norregaard, 2013).

While the justification for property transfer taxes could be found in fiscal federalism, equity considerations and macroprudential effectiveness, Mirrlees et al. (2011) and Norregaard (2013) advocate their abolition based on efficiency

grounds.²⁰ However, as Mirrlees et al. (2011) stresses, outright abolition would lead to windfall gains for existing owners, as property transaction costs have been capitalized into property values.

4.3 CAPITAL GAINS TAXES AND THE TAXATION OF IMPUTED RENTS 4.3.1 CAPITAL GAINS TAXATION

Like property transfer taxes, capital gains taxes on immovable property are levied at the time of the transfer of the property – albeit at the end of its life-cycle with respect to the current owner. Literature²¹ seems to conclude that capital gains taxes – like property transfer taxes – can lead to lock-in effects with fewer transactions and less labour mobility as well as distortions in the housing market with respect to tenure and housing size choices. In line with property transfer taxes, capital gains taxes for macroprudential policy objectives.

As capital gains taxes are levied on a flow, namely income resulting from the appreciation of the housing value, they are usually said to be more efficient taxes than property transfer taxes, which are levied on a stock. According to the Mirrlees et al. (2011) taxes on an income flow are also perceived as fairer than taxes on a stock of wealth. Capital gains taxes also follow the ability to pay principle as those with higher capital gains are subject to higher taxation. However, if the appreciation of the property value is due to general inflation or due to maintenance and improvement efforts, the taxation of overall capital gains might be perceived as unfair and discourage investment into housing (Bourassa and Grigsby, 2000). In practice, however, the advantages and disadvantages for housing markets stemming from capital gains on primary residences/or owner-occupied housing in general. This favourable tax treatment of housing taxation compared to other (capital) investment might deter investment decisions (compare section 3.1).

4.3.2 IMPUTED RENT TAXATION

As mentioned in 3.1.1 a Haig-Simons neutral tax treatment of owner-occupied housing would call for the taxation of imputed rents, as including them as income better represents the household's consumption opportunities. The failure to do so distorts resource allocation by incentivizing over-investment in housing compared to productive investment and reduces portfolio diversification (Fatica and Prammer, 2018). These capital market distortions are ultimately detrimental to economic growth (Figari et al., 2017). Focusing on the distributional impact of the non-taxation of imputed rents, Figari et al. (2017) show in a microsimulation analysis that including net imputed rents in the tax base of personal income not only equalises consumption opportunities between renters and homeowners but

496

²⁰ In the Mirrlees Review (2011) the argument for abolition also seems to be due to the specific design of the UK property transfer tax (stamp duty).

²¹ For a literature review on the taxation of capital gains on immovable property see Lenoel, Matsu nad Naisbitt (2018).

also reduces inequality. In their sample of EU countries, higher income families generally hold more expensive properties – translating into higher imputed rents – which are subject to higher marginal tax rates in the progressive personal income tax systems analysed.

This is in line with earlier empirical literature for the EU (Frick and Grabka, 2003; Frick, Goebel and Grabka, 2007; Frick et al., 2010). However, as Saarimaa (2011) and also Figari et al. (2017) point out, the effect seems to be small, and it hinges crucially on how the additional tax revenues are returned to the economy.

Moreover, the concept of imputed rent taxation suffers from severe issues (Bourassa and Grigsby, 2000): imputed rents are not measurable²² but remain presumptive, which impacts on their perceived fairness and make them administratively very cumbersome. Moreover, they can be perceived as a tax on wealth with detrimental effects on investment decisions.

Nevertheless, several authors (e.g. Gayer and Mourre, 2012; Blöchliger, 2015) consider imputed rent taxation *via* the income tax system a substitute for recurrent property taxation. However, there are several important differences, Firstly, imputed rent taxation *via* the personal income tax system might increase the distortions in the labour market.²³ If taxed at capital tax rates, this might distort households' incentives to shift between labour and capital income (Blöchliger, 2015). Secondly, imputed rent taxation is most likely less transparent than recurrent property taxes as it is levied at source with income. Finally, imputed rent taxation has a stronger link to the ability to pay principle, which might increase its perceived fairness. However, a change from recurrent property taxation – usually accruing to sub-central governments – to imputed rent taxation – income taxation is usually levied by central governments — is particularly difficult in federalist countries as it changes intergovernmental fiscal relations considerably (Blöchliger, 2015).

5 CONCLUSIONS

The ample literature on immovable property taxation can be grouped into two strands. The first covers the taxation of one type of real estate over its life-cycle, such as owner-occupied housing. It highlights the distortions property taxation introduces into housing investment and consumption decisions compared to other assets/consumption goods. The second strand assesses the merits and demerits of one particular tax on immovable property at a specific point in time, such as recurrent property taxation. The literature assesses the taxes with respect to induced distortions and their effectiveness and efficiency for economic growth, equity and fairness, fiscal federalism considerations and political economy obstacles.

²² Statistical offices estimate imputed rents on an aggregate level to be included in macroeconomic aggregates such as private consumption expenditure or GDP following ESA conventions.

²³ Tax distortions increase with t², as personal income tax is generally progressive, higher income implies higher t.

498

PUBLIC SECTOR ECONOMICS 44 (4) 483-504 (2020)

DORIS PRAMMER: IMMOVABLE PROPERTY: WHERE, WHY AND HOW SHOULD IT BE TAXED? A REVIEW OF THE LITERATURE AND ITS IMPLEMENTATION IN EUROPE While grouping the literature along these lines is relatively easy, it is more difficult to summarize the findings. The first strand of the literature agrees that immovable property taxation should be neutral to avoid distortionary behaviour. However, the neutrality benchmark to be chosen depends on the theoretical view taken. Immovable property could be taxed as an investment – for private or business use – or as a consumption good, which determines the benchmark and possible distortions. However, as noted by Lenoel, Matsu and Naisbitt (2018:41), "*most taxes are distortionary, and whether the distortions affecting housing are larger or less desirable than in other markets is still an unresolved issue.*"

The second strand assesses one type of tax at a time with respect to its vices and virtues. The focus is usually on efficiency considerations of immovable property taxation while other aspects such as equity, fiscal federalism and political economy considerations, have gained less attention. Given the trade-offs between these aspects, the relevant literature does not seem to allow for a general "best immovable property tax" ranking²⁴, since the overall effect of a tax ultimately depends on its exact design. Moreover, as indicated in the first strand of the literature, the overall effect of immovable property taxation also needs to be assessed over the object's life-cycle.

However, literature in both strands seems to conclude that property taxation on residential property has a lot of theoretical merits, but that its practical application departs significantly from the theoretical best practice (Slack and Bird, 2014; 2015). Hence, the relevant literature asks for practice to be brought closer to theory. At the same time political economy issues that might act as obstacles to reform should be carefully overcome.

Disclosure statement

No potential conflict of interest was reported by the author.

²⁴ Cournède, Goujard and Pina (2013) rank different consolidation strategies (increases in particular taxes and cuts in specific spending areas) according to their efficiency and equity trade-offs. A consolidation strategy based on recurrent property tax increases ranks comparatively high; consolidation strategies based on other immovable property taxes have not been assessed.

REFERENCES

- Albouy, D. and Findeisen, S., 2016. Should We Be Taxed Out of Our Homes? The Optimal Taxation of Housing Consumption. *Proceedings. Annual Conference on Taxation and Minutes of the Annual Meeting of the National Tax Association*, 109, pp. 1-24.
- Albouy, D. and Hanson, A., 2014. Are houses too big or in the wrong place? Tax benefits to housing and inefficiencies in location and consumption. *Tax policy and the economy*, 28(1), pp. 63-96. https://doi.org/10.1086/675588
- 3. Almy, R., 2013. Property tax regimes in Europe. Nairobi: UN-HABITAT.
- Andrews, D., Sánchez, A. C. and Johansson, Å., 2011. Housing markets and structural policies in OECD countries. *OECD Working Paper*, No. 836. https:// doi.org/10.1787/5kgk8t2k9vf3-en
- Arnold, J., 2008. Do tax structures affect aggregate economic growth? Empirical evidence from a panel of OECD countries. *OECD Working Paper*, No. 643. https://doi.org/10.1787/236001777843
- Banzhaf, S. and Lavery, N., 2010. Can the Land Tax Help Curb Urban Sprawl? Evidence from Growth Patterns in Pennsylvania. *Journal of Urban Economics*, 67(2), pp. 169–179. https://doi.org/10.1016/j.jue.2009.08.005
- Berger, D., Turner, N. and Zwick, E., 2017. Stimulating housing markets. NBER Working Paper, No. 22903.
- Berkovec, J. and Fullerton, D., 1992. A general equilibrium model of housing, taxes and portfolio choice. *Journal of Political Economy*, 100, pp. 390–429. https://doi.org/10.1086/261822
- Best, M. C. and Kleven, H. J., 2018. Housing Market Responses to Transaction Taxes: Evidence from Notches and Stimulus in the U.K. *The Review of Economic Studies*, 85(1), pp. 157–193. https://doi.org/10.1093/restud/rdx032
- Bird, R. M., 2011. Subnational Taxation in Developing Countries: A Review of the Literature. *Journal of International Commerce, Economics and Policy*, 2(1), pp. 139–161. https://doi.org/10.1142/s1793993311000269
- 11. Bird, R. M., Slack, N. E. and Tassonyi, A., 2012. *A Tale of Two Taxes: Property Tax Reform in Ontario*. Cambridge: Lincoln Institute of Land Policy.
- Blöchliger, H., 2015. Reforming the Tax on Immovable Property. OECD Economics Department Working Papers, No. 1205. https://doi.org/10.1787/5js30tw0n7kg-en
- Bourassa, S. C. and Grigsby, W. G., 2000. Income tax concessions for owneroccupied housing. *Housing Policy Debate*, 11(3). https://doi.org/10.1080/105 11482.2000.9521377
- Brueckner, J. K. and Kim, H., 2003. Urban Sprawl and the Property Tax. International Tax and Public Finance, 10, pp. 5–23.
- 15. Brzeski, J., Románová, A. and Franzsen, R., 2019. The evolution of property taxes in post-Socialist countries in Central and Eastern Europe. *ATI Working Paper*, WP/19/01.
- Buettner, T., 2017. Welfare Cost of the Real Estate Transfer Tax. CESifo Working Paper Series No. 6321.

- Catte, P. [et al.], 2004. Housing Markets, Wealth and the Business Cycle. *OECD Economics Department Working Papers*, No. 394. https://doi. org/10.1787/534328100627
- Chambers, M., Garriga, C. and Schlagenhauf, D. E., 2009. Housing policy and the progressivity of income taxation. *Journal of Monetary Economics*, 56(8), pp. 1116–1134. https://doi.org/10.1016/j.jmoneco.2009.10.007
- Cournède, B., Goujard, A. and Pina, Á., 2013. How to achieve growth-and equity-friendly fiscal consolidation? A proposed methodology for instrument choice with an illustrative application to OECD countries. *OECD Journal: Economic Studies*, 13(1). https://doi.org/10.2139/ssrn.2650018
- Davidoff, I. and Leigh, A., 2013. How do stamp duties affect the housing market? *Economic record*, 89(286), pp. 396–410. https://doi.org/10.1111/1475-4932.12056
- De Graaff, T. and van Leuvensteijn, M., 2013. A European Cross-Country Comparison of the Impact of Homeownership and Transaction Costs on Job Tenure. *Regional Studies*, 47(9), pp. 1443–1461. https://doi.org/10.1080/0034 3404.2011.626761
- Eerola, E. [et al.], 2019. Effects of housing transfer taxes on household mobility. *CESifo Working Paper*, No. 7750.
- 23. Englund, P., 2003. Taxing residential housing capital. *Urban Studies*, 40(5-6), pp. 937–952. https://doi.org/10.1080/0042098032000074254
- 24. ESRB, 2015. *Report on Residential Real Estate and Financial Stability in the EU*. Frankfurt am Main: European Systemic Risk Board.
- 25. European Commission, 2011. Growth-friendly tax policies in Member States and better tax coordination in the EU. Annual growth survey 2012 annex IV. COM (2011) 815 final Annex IV, 23 November 2011. Bruxelles: European Commission.
- Fatica, S. and Prammer, D., 2018. Housing and the tax system: how large are the distortions in the euro area? *Fiscal Studies*, 39(2), pp. 299–342. https://doi. org/10.1111/1475-5890.12159
- Fatica, S., 2015. Housing taxation: from micro design to macro impact. *Quarterly Report on the Euro Area*, 14(1), pp. 27–33.
- Figari, F. [et al.], 2017. Removing homeownership bias in taxation: The distributional effects of including net imputed rent in taxable income. *Fiscal Studies*, 38(4), pp. 525–557. https://doi.org/10.1111/1475-5890.12105
- Frick, J. R. [et al.], 2010. Distributional effects of imputed rents in five European countries. *Journal of Housing Economics*, 19, pp. 167–179. https://doi.org/10.1016/j.jhe.2010.06.002
- Frick, J. R. and Grabka, M. M., 2003. Imputed rent and income inequality: a decomposition analysis for the UK, West Germany and the USA. *Review of Income and Wealth*, 49(4), pp. 513–537. https://doi.org/10.1111/j.0034-6586.2003.00102.x

- Frithsche, C. and Vandrei, L., 2016. The German Real Estate Transfer Tax: Evidence for Single-Family Home Transactions. *ifo Working Paper*, No. 232. https://doi.org/10.15396/eres2017_97
- 33. Fullerton, D. and Metcalf, G. E., 2002. Tax incidence. *Handbook of public economics*, 4, pp. 1787–1872. https://doi.org/10.1016/s1573-4420(02)80005-2
- 34. Gayer, C. and Mourre, G., 2012. Property taxation and enhanced tax administration in challenging times. *Economic Papers*, No. 463.
- Gervais, M., 2002. Housing taxation and capital accumulation. *Journal of Monetary Economics*, 49, pp. 1461–1489. https://doi.org/10.1016/s0304-3932(02)00172-1
- 36. Glaeser, E. L., 2011. Rethinking the Federal Bias Toward Homeownership. *Cityscape: A Journal of Policy Development and Research*, 13(2), pp. 5–37
- Hanson, A., 2012. Size of Home, Home Ownership, and the Mortgage Interest Deduction. *Journal of Housing Economics*, 21(3), pp. 195–210. https://doi. org/10.1016/j.jhe.2012.06.001
- 38. HFCN, 2016. The Household Finance and Consumption Survey: results from the second wave. *ECB Statistics Paper*, No. 18.
- Hilber, C. A. L. and Lyytikäinen, T., 2017. Transfer taxes and household mobility: Distortion on the housing or labor market? *Journal of Urban Economics*, 101, pp. 57–73. https://doi.org/10.1016/j.jue.2017.06.002
- Hua, C. and Craig, R. S., 2011. Determinants of Property Prices in Hong Kong SAR: Implications for Policy. *IMF Working Paper*, No. 277. https://doi. org/10.5089/9781463925949.001
- Johannesson-Linden, A. and Gayer, C., 2012. Possible reforms of real estate taxation: Criteria for successful policies. *European Economy, Occasional Papers*, No. 119.
- 42. Koetter, M., Marek, P. and Mavropoulos, A., 2019. *Housing Demand and Credit Supply: Evidence from the German Real Estate Transaction Tax.* Mimeo.
- Kuttner, K. N. and Shim, I., 2013. Can non-interest rate policies stabilize housing markets? Evidence from a panel of 57 economies. *Bank for International Settlements Working Paper*, No. 433. https://doi.org/10.3386/w19723
- 44. Lenoel, C., Matsu, J. and Naisbitt, B., 2018. International evidence review on housing taxation. *CaCHE Working Paper*, No. R2018_02_03.
- Martin, H. and Hanson, A., 2016. Metropolitan area home prices and the mortgage interest deduction: estimates and simulations from policy change. *Regional Science and Urban Economics*, 59, pp. 12–23. https://doi. org/10.1016/j.regsciurbeco.2016.03.006

- 46. Matsaganis, M. and Flevotomou, M., 2007. The impact of mortgage interest tax relief in the Netherlands, Sweden, Finland, Italy and Greece. *EUROMOD Working Paper Series*, No. EM2/07.
- Mirrlees, J. [et al.], 2011. *Tax by Design: the Mirrlees Review*. Oxford: Oxford University Press. https://doi.org/10.1111/j.1475-5890.2011.00140.x
- Norregaard, M. J., 2013. Taxing immovable property revenue potential and implementation challenges. *IMF Working Paper*, No. 129. https://doi. org/10.5089/9781484369050.001
- Oates, W. E. and Fischel, W. A., 2016. Are local property taxes regressive, progressive, or what? *National Tax Journal*, 69(2), pp. 415-434. https://doi. org/10.17310/ntj.2016.2.06
- Oates, W. E. and Schwab, R. M., 2004. What should local governments tax: income or property? *City taxes, city spending,* pp. 7–29. https://doi. org/10.4337/9781845421632.00009
- Oliviero, T. [et al.], 2019. House prices and immovable property tax: Evidence from OECD countries. *Metroeconomica*, 70(4), pp. 776–792. https://doi. org/10.1111/meca.12253
- Poterba, J. M. and Sinai, T. M., 2008. Tax expenditures for owner-occupied housing: deductions for property taxes and mortgage interest and the exclusion of imputed rental income. *American Economic Review*, 98(2), pp. 84–89. https://doi.org/10.1257/aer.98.2.84
- Poterba, J. M. and Sinai, T. M., 2011. Revenue costs and incentive effects of mortgage interest deduction for owner-occupied housing. *National Tax Journal*, 64, pp. 531–564. https://doi.org/10.17310/ntj.2011.2s.05
- Poterba, J. M., 1984. Tax subsidies to owner-occupied housing: an assetmarket approach. *Quarterly Journal of Economics*, 99, pp. 729–752. https:// doi.org/10.2307/1883123
- Poterba, J. M., 1992. Taxation and housing: old questions, new answers. *American Economic Review*, 82(2), pp. 237–242. https://doi.org/10.3386/ w3963
- Rosen, H. S., 1979. Housing Decisions and the US Income Tax: An Econometric Analysis. *Journal of Public Economics*, 11(1), pp. 1–23.
- Rosen, H. S. and Rosen, K. T., 1980. Federal Taxes and Homeownership: Evidence from Time Series. *Journal of Political Economy*, 88(1), pp. 59–75. https://doi.org/10.1086/260847
- Rosen, H. S., 1985. Housing subsidies: effects on housing decisions, efficiency, and equity. In: M. Feldstein and A. Auerbach (eds). *Handbook of Public Economics*, vol. 1. Amsterdam: North-Holland. https://doi.org/10.3386/w1161
- 59. Saarimaa, T., 2011. Imputed rental income, taxation and income distribution in Finland. *Urban Studies*, 48(8), pp. 1695–1714. https://doi. org/10.1177/0042098010377474

PUBLIC SECTOR DORS PRAMME ECONOMICS WHERE, WHY AN 44 (4) 483-504 (2020) OF THE LITERATU

- Slack, E. and Bird, R. M., 2015. How to reform the property tax: lessons from around the world. *IMFG Papers on Municipal Finance and Governance*, No. 21.
- 62. Smart, M. 2013. The Reform of Business Property Tax in Ontario: An Evaluation. *IMFG Papers 10*. University of Toronto, Institute on Municipal Finance and Governance.
- 63. Song, Y. and Zenou, Y., 2006. Property Tax and Urban Sprawl: Theory and Implications for US Cities. *Journal of Urban Economics*, 60(3), pp. 519–534. https://doi.org/10.1016/j.jue.2006.05.001
- 64. TEDB, 2020. Taxes in Europe Database.
- Van Ommeren, J. and Leuvensteijn, M. V., 2005. New evidence of the effect of transaction costs on residential mobility. *Journal of regional science*, 45(4), pp. 681–702. https://doi.org/10.1111/j.0022-4146.2005.00389.x
- 66. Voith, R., 1999. Does the U.S. Tax Treatment of Housing Create an Incentive for Exclusionary Zoning and Increased Decentralization? *Federal Reserve Bank of Philadelphia Working Paper*, No. 99–22. https://doi.org/10.21799/ frbp.wp.1999.22
- Wassmer, R. W., Fisher, R. C. and Kuloszewski, Z., 2019. Perspectives of the Property Tax Forty Years after Proposition 13. https://doi.org/10.2139/ ssrn.3434005
- Khignesse, G. and Verbist, G., 2019. An assessment of the spatial efficiency of tax benefits for home mortgages in Belgium. *Housing Studies*, pp. 1–27. https://doi.org/10.1080/02673037.2018.1562057