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ABSTRACT

Taxing Home Ownership: Distributional Effects of Including Net Imputed Rent in Taxable Income^{*}

Imputed rental income of homeowners is tax exempt in most countries, despite the long-standing arguments recommending its inclusion in the tax base, on both equity and efficiency grounds. The current fiscal crisis revived interest towards this form of taxation. The paper investigates the fiscal and distributional consequences of including homeowners' imputed rent, net of mortgage interest and maintenance costs, in taxable income as any cash income source that extends consumption opportunities. Three scenarios are analysed in six European countries: in the first imputed rent is included in the taxable income of homeowners, while at the same time existing mortgage interest tax relief schemes and taxation of cadastral incomes are abolished. In two further revenue-neutral scenarios, the additional tax revenue raised through the taxation of imputed rent is redistributed to taxpayers, either through a proportional rebate or a lump-sum tax credit. Results show how including net imputed rent in the tax base might affect inequality in each of the countries considered. Housing taxation appears to be a promising avenue for raising additional revenues, or lightening taxation of labour, with no inequality-increasing side-effects.

JEL Classification: D31, H23, I31, I32

Keywords: housing taxation, imputed rent, income distribution, inequality, microsimulation

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1 Introduction

Most countries' tax systems entail a favourable tax treatment of home ownership, compared to rental-occupied housing. The tax-exemption of imputed rental income (and other provisions such as deductions allowed for mortgage interest repayments and other homeowners' expenses) lower the cost of housing services of homeowners, relative to those of renters. Such lack of neutrality in taxation and its consequences for a wide range of economic outcomes, most notably in the housing and capital markets, have long been recognized in the economic literature (Aaron, 1970; Rosen, 1979; Poterba, 1992; Turnovsky and Okuyama, 1994). In addition to neutrality and efficiency arguments, distributional reasons to tax homeowners' imputed rental income have been unfolded, for example tax exemptions tending to favour higher income taxpayers, as the advantage depends on the homeowner's marginal tax rate. Arguments in favour of taxation of net imputed rent are quite old in Economics as well as Finance and Political Science (see, for example, Marsh, 1943; Goode, 1960; Musgrave, 1967; Vickrey, 1993).¹ In recent years, the financial crisis has revived interest towards housing taxation, as concerns have been raised about the role played by housing tax treatment in the US housing bubble that triggered the crisis (IMF, 2009; Glaeser, 2010; Ceriani *et al.* 2011). At the same time, on the other side of the Atlantic, housing taxation is holding the spotlight as one of the few practicable ways of raising tax revenues while lowering the tax wedge on labour income (Lloyd, 2009; Mirrlees *et al.*, 2011, Pellegrino and Turati, 2012).

In this context, this paper investigates how implementing tax policy changes that would remove the provisions favouring homeownership (i.e. including imputed rent in the personal income tax base, while abolishing mortgage interest payment deductions) would affect the distribution of income and marginal effective tax rates in six European countries (Belgium, Germany, Greece, Italy, the Netherlands and the United Kingdom).

Even in the (hypothetical) absence of income taxation, accounting for the income value of home ownership in distributional analyses is, from a theoretical viewpoint, superior to analyses that only look at cash disposable income (Atkinson and Bourguignon, 2000; Canberra Group, 2001; Aaberge *et al.*, 2010.). Several empirical studies have shown that income inequality declines when a value for imputed rent is included in the income concept (see e.g. Lerman and Lerman, 1986; Smeeding *et al.*, 1993; Meulemans and Cantillon, 1993; Yates, 1994; Buckley and Gurenko, 1997; Kiel and Zabel, 1999; Marquier, 2003; Frick and Grabka, 2003; Gasparini and Escudero, 2004; Saunders and Siminski, 2005; Frick *et al.*, 2007, Frick *et al.*, 2010; for opposite evidence, see Onrubia *et al.*, 2009

¹ Nevertheless, a few authors argue in favour of keeping net imputed rent untaxed; see, for example, Bourassa and Grigsby (2000), on the grounds of the administrative infeasibility of accurate net imputed rent taxation and of the chance it might in fact result in a wealth tax.

and, to a lesser extent, Garner and Short, 2009). The next section describes how imputed rent can be estimated for a representative sample of households in each country and will show how its inclusion affects homeowners' equivalised disposable income.

If income is accepted as an indicator of tax units' ability to contribute, taxation of imputed rent appears the logical consequence. From a theoretical viewpoint, following Haig (1921) and Simons (1938), an appropriate income tax base should reflect both monetary and non-monetary consumption opportunities. Imputed rent enhances homeowners' consumption ability because they benefit from housing services they would otherwise need to pay for, thus depleting cash resources. Imputed rent can, therefore, be regarded as a form of income; treating it differently from other types of income in defining the tax base may be undesirable both on equity and on efficiency grounds, as discussed in Section 3, together with a brief overview of housing taxation policies in the countries included in our analysis.

Building on this ground, using the multi-country tax benefit model EUROMOD, we include imputed rent, net of mortgage interest payments and maintenance and owner occupier costs, in the taxable income in each country. At the same time, special tax treatments of incomes or expenses related to the main residence, that if retained would result in double taxation or double tax concession (i.e. taxation of cadastral income and mortgage interest tax relief), are removed. The tax-benefit model EUROMOD and the simulations of alternative tax policy options are presented in section 4. We propose three scenarios. The first one entails the taxation of imputed rent in a similar way as cash income and is non-revenue neutral. Then, we consider two further scenarios in which the corresponding additional revenues are returned to taxpayers in revenue-neutral reforms.

Section 5 provides the empirical results. First, we analyse the likely distributional effects of our three scenarios. Marginal effective tax rates are also presented to give an insight into the labour incentives implied by each scenario. Naturally, the results we obtain are affected by differences in countries' overall tax provisions, and by both the characteristics of the housing market and the joint distribution of housing tenure and household income, which differ considerably for the six countries studied here.

2 Including imputed rent in the income concept

Both country specific and cross-country distributional analyses typically rely on households' disposable cash income as a measure of living standards. However, there are at least two reasons why including imputed rent² - as any other sort of non cash component - in the underlying income concept

² The European Commission proposes the following definition of imputed rent: "The imputed rent refers to the value that shall be imputed for all households that do not report paying full rent, either because they are owner-occupiers or they live in accommodation rented at a lower price than the market price, or because the accommodation is rent-free" (EU Commission Regulation N°1980/2003). Hence, three groups of potential

would seem more appropriate. First, home owners enjoy housing services they would otherwise need to pay for, thus depleting cash resources. One should, therefore, acknowledge how their consumption opportunities might differ from those of private renters bearing higher housing costs for living in comparable properties. In this respect, including imputed rent in the income concept better reflects homeowners' enhanced command over resources, when compared to otherwise identical renters.

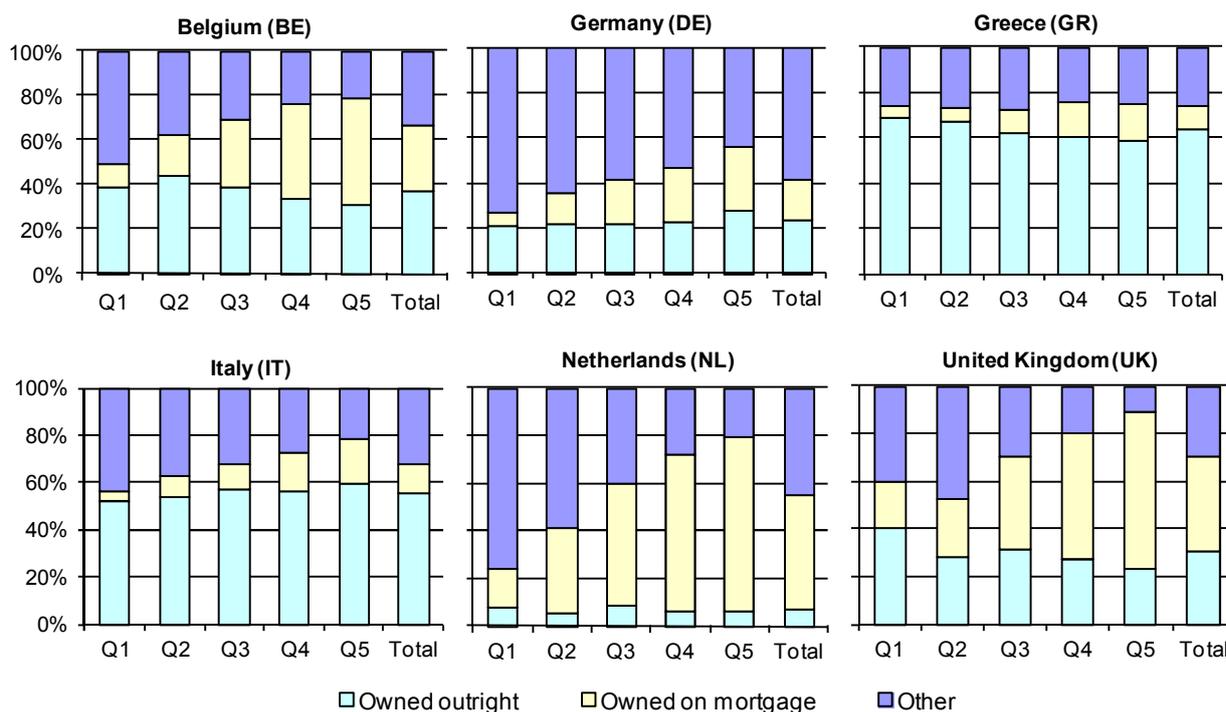
Second, the inclusion of imputed rents allows for more coherent comparisons over time, for example in times of changing home ownership or housing costs patterns (Frick *et al.*, 2010). International comparisons might also yield biased results under a cash only income concept, when the housing tenure structure varies substantially across countries. As illustrated in Graph 1, there is a striking difference in the percentage of home owners across the six European countries studied here that cash income measures fail to reflect, resulting in possibly biased judgements on relative living standards. In Belgium, Greece, Italy, the Netherlands and the United Kingdom the majority of the population lives in own accommodation, while in Germany most population members live in rented dwellings. In Italy and, particularly, in Greece, the majority of the population lives in residencies owned outright, while in the Netherlands and the United Kingdom most of the homeowners still have mortgage loans outstanding. Graph 1 also presents tenure status across income quintiles (Q1: poorest, ... Q5: richest), with population members ranked according to their equivalised disposable household cash income.

In all countries the higher the quintile the higher the share of the population living in accommodation owned on a mortgage and the lower the share of those living in rented housing. In most countries the shares of those living in property owned outright are relatively stable across quintiles.

The method used to estimate the value of imputed rent requires careful consideration. For a general description of the various possible approaches to calculate imputed rent on the basis of micro data, we refer to Frick and Grabka (2003), Frick *et al.* (2007) and Frick *et al.* (2010). They propose three methods: the opportunity cost approach, the capital market approach and the self-assessment approach.

beneficiaries of imputed rent can be identified, namely owner-occupiers, rent-free tenants and tenants with below-market rent; this last group can include those who live in social housing or those who benefit from rent reduction by their private landlord (e.g. relatives, employer). Here, the focus is on imputed rent for homeowners. For an analysis of the distributional effects of public benefits in kind, including public housing, in five of the countries examined here, see Paulus *et al.* (2010), as well as OECD (2011) for a broader international comparison.

Graph 1: Distribution of the population according to housing tenure



Notes: Total: total population. Q1 – Q5: household equivalised disposable cash income quintile groups. See Table 1 for data sources. Source: Own calculations using EUROMOD version D25.

The *opportunity cost approach* (or “rental equivalence method”) estimates the opportunity cost of housing in a non-subsidised rental market. This is often done through a hedonic regression estimation using a two-step procedure. In the first step a regression model is estimated with rent (if possible normalized for size of residence) as dependent variable based on the population of tenants in the private market; the covariates may refer to characteristics of the dwelling, household income, etc. In the second step the resulting coefficients are applied to otherwise similar owner-occupiers. This procedure may be further refined by correcting for selection bias into the owner status (e.g. by applying a Heckman selection correction). An alternative to the regression-based approach is to allocate accommodations to mutually exclusive strata, based on house characteristics, and to impute the value of the average rent paid by market tenants to other non market rented accommodations belonging to the same stratum; these data can come from the same dataset or from external rental statistics. The *capital market approach* (or “user cost method”) focuses on the alternative use of capital on the capital market. It starts from the trade-off between becoming owner of a dwelling and investing these resources into financial assets that (should) generate equal risk-adjusted real income flows through interest and dividends. Saunders *et al.* (1992) propose to equate the implicit rate of return on housing equity to a relatively safe private market rate of return on an equal value of investment (such as a long-term government bond). A drawback of this approach is that it is based on the homeowner’s subjective estimation of the current market value, which possibly suffers from distortions (which may be particularly a problem among long-time homeowners) and, further, it may

be sensitive to the selection of the interest rate. The *self-assessment approach* is based on the assessment of respondents of the rental value of their home. The amount answered on the self-assessment question is taken to be the value of the imputed rent (which of course can also suffer from distortions due to subjective estimates).

In all three approaches, relevant costs need to be deducted in order to obtain the required *net* imputed rent. Relevant costs include operating and maintenance (excluding heating) costs. One also needs to consider costs linked to owner occupation such as mortgage interest payments and property taxes. Especially the deduction of interest payments is important in reducing the income advantage derived from owner-occupied housing. As interest payments are typically a heavier burden for younger households, older homeowners tend to benefit more from net imputed rent (see e.g. Frick and Grabka, 2003).

Table 1 gives an overview of the data sources used for our empirical analysis, as well as the methods used to estimate net imputed rent (details can be found in Frick *et al.* 2010). For almost all countries, the opportunity cost approach was the preferred option, using a correction for selection bias in three countries (Belgium, Germany and Greece). Given the very small private rental market in the Netherlands, the opportunity cost approach could not be used for this country and, hence, the capital market approach was applied³.

Table 1: Data sources and methods used to estimate imputed rents

	BE	DE	GR	IT	NL	UK
<i>Dataset - year</i>	Statistics on Income and Living Conditions (EU-SILC) 2004	German Socio Economic Panel (GSOEP) 2002	Household Budget Survey (HBS) 2004/05	Statistics on Income and Living Conditions (IT-SILC) 2004	Socio- Economic Panel (SEP) 2001	Family Resources Survey (FRS) 2003/04
<i>Method to estimate IR</i>	OC-R (H)	OC-R (H)	OC-R (H)	OC-R	CM	OC-R
<i>n (individuals)</i>	12,971	16,108	17,386	60,734	10,344	67,123
<i>n (households)</i>	5,275	11,194	6,555	24,204	4,329	28,860
<i>N (individuals in millions)</i>	10.4	78.5	10.9	57.1	15.5	58.5
<i>N (households in millions)</i>	4.4	38.7	4.0	23.2	6.9	25.2

Notes: Method to estimate Imputed Rent (IR): OC-R = Opportunity Cost Approach, regression based including Heckman selection model (H) or not; CM = Capital Market Approach.

Table 2 shows how home owners' equivalised disposable income varies once net imputed rent is accounted for. The value of living in owner-occupied housing appears substantial: on average, it ranges from 7% (Belgium) to 13% (Greece) of disposable cash income. As can be expected, the

³ A comparison of the implementation of the opportunity cost approach and the capital market approach in Germany (Frick *et al.* 2007) and in five European countries (Frick *et al.* 2010) indicates that the choice of method for estimating imputed rent does not substantially affect the distributive outcomes.

advantage is more important for outright owners than for those on a mortgage. For the small group of outright owners in the Netherlands net imputed rent amounts to 20% of disposable income. The main beneficiaries of net imputed rent in all these countries are the elderly who, in general, are no longer paying off mortgages and are hence outright owners (see also Frick *et al.*, 2010). In the following, we take disposable income extended with net imputed rent, further referred to as ‘extended income’, as our baseline income concept for analysing the distributive effects of different housing taxation policies.

Table 2: Change in equivalent disposable income (in %) due to inclusion of net imputed rent

	BE	DE	GR	IT	NL	UK
All owners	7%	10%	13%	11%	8%	9%
- <i>Owner outright</i>	9%	16%	15%	11%	20%	18%
- <i>Owner on mortgage</i>	6%	4%	8%	10%	7%	6%

Source: Own calculations using EUROMOD version D25.

3 Housing taxation: principles and practices in six European countries

The treatment of housing by the tax and benefit system takes numerous forms and varies considerably across countries. In most countries the imputed rent enjoyed by owner-occupied households is exempt from income taxation; in the few countries where it is subject to income tax (Andrews *et al.*, 2011), the corresponding notional rents are usually substantially lower than private market rents. In many countries there are also mortgage interest tax relief policies. Regarding rented housing, in some countries part of the rent paid by market renters is exempt from taxation, while in others housing is provided at below market rates to particular segments of the population (in the forms of social renting or rent subsidies). Moreover, there are taxes associated with the transfer of dwellings (usually in the form of stamp duties) as well as property taxes.

A common trait, across the different country-specific housing taxation practices, is that owner-occupied housing is taxed less heavily than rent-occupied housing as well as other forms of capital investment (Andrews *et al.*, 2011). Partly as a result of existing policies, home ownership rates have risen almost steadily in almost all OECD countries since the mid 1980s (Andrews *et al.*, 2011). The main argument usually put in favour of promoting home ownership is that it creates positive externalities because home owners tend to take more interest in the community than renters (Di Pasquale and Glaeser, 1999) while, in practice, the strength of political economy arguments highlighting how voting patterns may be influenced by policies affecting home ownership should not be underestimated (Ball, 1983). The latter may explain the difficulties encountered by a number of governments in their efforts to withdraw policies favouring home ownership vis-à-vis other forms of housing tenure (Wood, 1990; Arnold *et al.*, 2011).

On the other hand, promoting home-ownership may restrict residential and, hence, labour market mobility (Bover *et al.*, 1989; Cameron and Muellbauer, 1998; Boeri and Terrell, 2002) as well as increase house price volatility leading to macroeconomic instability (Catte *et al.*, 2004). But even if one believes that home ownership should be promoted as beneficial for the society, the question remains of why it should be left to the tax system to do so: the asymmetric tax treatment of homeowners and renters results in both inequity and inefficiency.

According to the Haig-Simons tax base definition, any income that increases individuals' ability to consume, while leaving unaffected their original capital stock, should be included in the income tax base. Including imputed rent in taxable income as any other income source (i.e. considering the house as an investment good) better reflects an individual's actual capacity to consume and guarantees that horizontal equity principles are respected: homeowners and renters endowed with the same ability to consume bear the same taxation burden. Further, vertical equity principles call for imputed rent taxation: under progressive taxation, provisions such as imputed rent exemption and mortgage interest relief benefit disproportionately higher income taxpayers, because they face higher marginal tax rates.⁴

On efficiency grounds, non neutral tax provisions favouring homeownership introduce distortions in resource allocations, imposing a deadweight loss to the society (Skinner, 1996); moreover, the welfare loss entailed by income taxation is further increased by such tax base reductions. A number of theoretical as well as empirical studies have pointed out that several of these policies lead to capital market distortions that are detrimental to economic growth (such as excessive investment in housing) as well as to undesirable distributional outcomes (Kneller *et al.*, 1999; Johansson *et al.*, 2008; Arnold *et al.*, 2011).

In the following sections, we use micro-simulation techniques to study the distributional effects of taxing imputed rent net of maintenance and other owner occupier costs and mortgage interest payments, and removing mortgage interest tax reliefs, in six European countries. As shown in Table 3, in four of the countries studied here, imputed rent is in principle taxed, though with important qualifications: in Belgium and Italy cadastral income is part of taxable income but can be (almost) entirely deducted; in Greece only part of the imputed rent of larger dwellings is taxed that affects relatively few households; in the Netherlands a (small) fraction of the market value of the dwelling is included in taxable income. Mortgage interest tax relief exists in four of the six countries included in our analysis.

⁴ Although, as Yates (1994) points out, since in many countries the elderly are overrepresented among both homeowners and the poor, the results of imputed rent taxation may not necessarily be progressive.

Table 3: Housing taxation policies for principal dwelling of homeowners for six European countries

	BE 2003	DE 2001	GR 2004	IT 2003	NL 2001	UK 2003
- Taxation of imputed rent?	Cadastral income included in taxable income but (almost) fully deductible.	No	Yes on principal dwellings larger than 200 m ²	Cadastral income included in taxable income, but fully deductible	Yes. Imputed rent up to 0.55% of market value of the dwelling.	No
- Mortgage interest tax relief?	Yes. Fully deductible for loans taken up before 2005.	No	Yes. Tax allowance for loans taken up before 2003. Tax credit of 20% of annual interest for loans after 2002.	Yes. Tax credit equal to 19% with maximum of €760.	Yes. Fully deductible.	No
- Capital gains tax on primary residence?	No	No	No	No	No	No

Source: EUROMOD Country Reports, Andrews *et al.* (2011).

4 Methodology and simulations

4.1 EUROMOD: a multi-country tax benefit model

The policy reform simulations are performed on the income survey data reported in Table 1 using EUROMOD, the multi-country European wide tax-benefit microsimulation model. EUROMOD is a static model that provides measures of direct taxes, social insurance contributions, cash benefits as well as market incomes in a comparable way across countries (see Sutherland (2007) for further information). EUROMOD simulates cash benefit entitlements and direct tax and social insurance contribution liabilities on the basis of the tax-benefit rules in place and information available in the underlying datasets. Instruments which are not simulated are taken directly from the data.

The tax-benefit systems simulated in this paper refer to different years across countries: 2001 for Germany and the Netherlands, 2003 for Belgium, Italy and the United Kingdom, and 2004 for Greece. The reference time period for income data matches the policy year with the only exception of the Netherlands for which monetary values have been updated (from 2000 to 2001) according to the appropriate price and income indices.

4.2 Alternative policy simulations

The first simulation includes net imputed rent in the personal income tax base, irrespective of budget neutrality (IR1). Next, two budget neutral scenarios are discussed (IR2 and IR3) which, in effect, seek to shift part of the tax burden from cash income to imputed rent.

Net imputed rent included in the taxable income, no revenue neutrality (IR1)

First, we use EUROMOD to simulate a scenario in which the estimated net imputed rent is included in the taxable income definition for home owners.⁵ As a consequence, the net imputed rent is taxed at least at the same marginal tax rate that individuals face under the current income tax system. In order to make the simulation coherent across countries, in this scenario we avoid any double taxation and double tax expenditures related to imputed rent and house purchasing costs.

First, we exclude from the tax base any existing amount of cadastral income. Second, we abolish any existing mortgage interest tax reliefs⁶ (present in all countries but Germany and the United Kingdom, see Table 3) because the deduction of mortgage costs is part of the net imputed rent calculation.

Existing property and wealth taxes have not been modified, on the basis that they refer to different concepts of tax base. The treatment of housing costs by other parts of the tax-benefit system (e.g. mortgage costs in some social assistance benefits) has not been amended as our focus here is on the inclusion of income from housing, net of costs, in the base of personal income tax.

Revenue neutrality through a proportional rebate (IR2) and a lump sum tax credit (IR3)

We also simulate two revenue neutral scenarios in which the additional tax revenue raised from home owners through the taxation of imputed rent is returned to all income taxpayers, irrespective of their tenure status. This will shift the income tax burden from cash income (mainly labour income) to imputed rent and from tenants to owners. We follow two different approaches to guarantee revenue neutrality. Under the first approach (IR2), taxpayers enjoy a proportional reduction in their tax liability. This means that the extra tax revenue raised is given back as a tax rebate proportional to the (pre-rebate) tax liability when including imputed rents. Thus, it is only given to those with positive personal income tax liability after taxing imputed rents. It is similar to a cut in tax rates. Under the second approach (IR3), a non-refundable lump sum tax credit is assigned to all taxpayers (again, all those with positive income tax after including imputed rents). This means that the extra tax revenue raised is given back as an equal tax credit to all taxpayers (resulting negative taxes have been set to 0). This is broadly similar to an increase in the tax threshold. In the case of Germany, where husband and wife are taxed jointly, the rebate is given in proportion to each spouse's share of the tax base under IR2. Under IR3, both husband and wife receive the tax credit, if each one's income adds to the joint tax base.

⁵ Due to lack of information on the individuals responsible for the accommodation, the whole amount of the imputed rent has been allocated to the person with the highest taxable income. This means that imputed rent is taxed at the highest marginal rate. Hence, the results presented here should be interpreted as showing the upper bound of the likely distributional effects.

⁶ Using EUROMOD for five countries (including Greece, Italy and the Netherlands), Matsaganis and Flevotomou (2007) found that mortgage interest tax relief is disproportionately captured by higher income groups and is, hence, a regressive policy. This result is in line with the results of similar studies for other countries (see Andrews and Caldera Sánchez, 2011 and the references cited there).

Revenue neutrality is imposed in terms of government budget (i.e. the net effect of both income tax and cash benefits). This approach allows social assistance schemes to at least partly compensate higher taxes, in those countries where means tests are based on net income.

The paper focuses on the first round fiscal and distributional effect of the tax reforms. Therefore, we do not attempt to model any behavioural reactions that may take place in the labour, housing, or financial markets.

5 Distributional and fiscal effects of including imputed rent in taxable income

Table 4 reports the effects of taxing net imputed rent while replacing all special tax treatments of incomes and expenses related to home ownership (IR1) on three aggregates: the taxable income, the income tax revenues collected by the government and the extended disposable income of the population (that is, disposable income after the inclusion of imputed rent in the income concept). Including imputed rent in taxable income entails a considerable change in taxable income⁷: the change is between 5% (Germany) and 8% (Greece) except in the Netherlands where the imputed rent is actually taxed and it is just 2%. Income tax revenues rise substantially in all countries under examination. The proportional changes are larger where the mortgage interest tax relief is very important (the Netherlands: +27.1%) or the income taxes collected are relatively low (Greece: +24.2%). At the other extreme, the proportional increase in income tax is smaller in the two countries without mortgage interest tax relief, namely Germany (+5.8%) and the United Kingdom (+9.5%). Moreover, many population members in Germany live in market rented accommodation and do not enjoy imputed rent, whereas in the United Kingdom tax rates are relatively low and a number of older beneficiaries of net imputed rent are below the tax threshold.

Cross-country differences in the reduction in extended disposable income are remarkable. The change in extended disposable income is relatively small in the two countries without mortgage interest tax relief, Germany (-1.2%) and the United Kingdom (-1.7%). In contrast, the change in extended disposable income is considerable in the Netherlands (-4.5%) where mortgage interest tax relief is very important (see also Matsaganis and Flevotomou, 2007), Belgium (-3.6%) and Italy (-3.2%) where home ownership is widespread. Home ownership is also widespread in Greece, but the change in extended disposable income is smaller (-2.5%) since many of the homeowners have low incomes

⁷ It is worth noting that the change in the taxable income is due to a combination of (i) adding imputed rent to the taxable incomes; (ii) removing existing taxed elements of cadastral income/imputed rent (BE, IT, NL); (iii) interactions between taxable incomes and tax allowances, among other things, due to removing existing mortgage interest related tax allowances (BE, GR). Note also that abolishing existing mortgage interest related tax credits (GR, NL) has no effect on the taxable income.

and remain under the (relatively high) tax threshold even after the inclusion of imputed rent in the concept of taxable income.

Table 4: Fiscal effects of including imputed rent in taxable income

	Proportional change in		
	Taxable Income	Personal Income Tax Revenue	Extended disposable Income
BE	6.4%	13.9%	-3.6%
DE	4.9%	5.8%	-1.2%
GR	7.8%	24.2%	-2.5%
IT	6.7%	13.2%	-3.2%
NL	2.3%	27.1%	-4.5%
UK	7.0%	9.5%	-1.7%

Note: Net imputed rent included in taxable income, no revenue neutrality (IR1). Source: Own calculations using EUROMOD version D25.

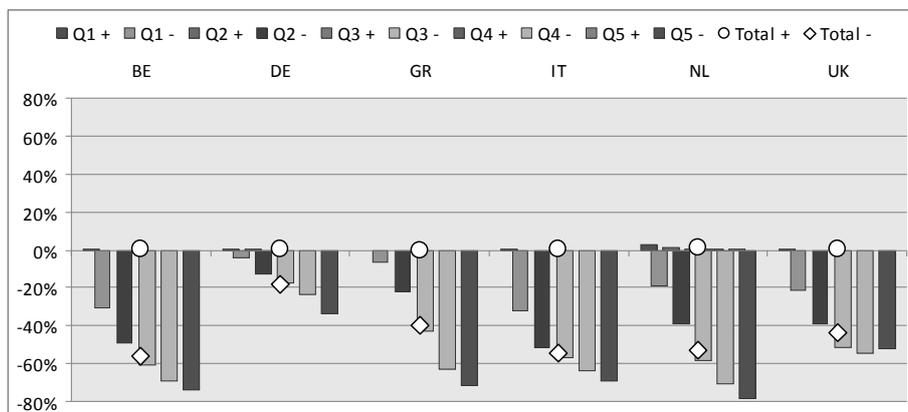
The figures reported in Table 4 – particularly those showing the increase in tax revenue in the second column - suggest that it is rather unrealistic to expect that imputed rent will be taxed without any significant accompanying reduction in taxes. Therefore, it seems worth considering two alternative revenue-neutral policy combinations. In the first scenario, revenue neutrality is achieved through a proportional rebate in the tax liabilities of all taxpayers (IR2). In the second scenario, neutrality is achieved through a lump sum non-refundable tax credit to everybody with positive tax liability (IR3). Naturally, these policies are likely to have very different distributional effects, since imputed rent is likely to be more equally distributed than tax liabilities.

A first indication of the direction of the distributional effects is provided in Graph 2, which shows the share of gainers and losers per quintile as we move from the baseline distribution of extended disposable income (i.e. including net imputed rent) to the distribution of extended disposable income resulting from the three tax reform scenarios. As can be expected, the first scenario (IR1) results almost exclusively in losers⁸ (Graph 2a), ranging from 18% of all households (Germany, with the lowest share of imputed rent beneficiaries) to 56% (Belgium). In all countries, the share of losers increases with income level (apart from the top quintile in the UK). In countries like Belgium, Greece and the Netherlands, the share of losers is higher than 70% in the top quintile.

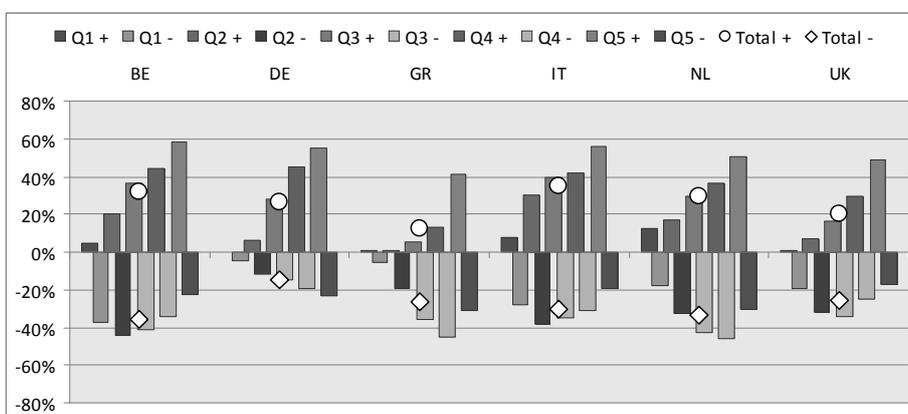
⁸ The few gainers observed in some countries are those who benefit from the replacement of the existing tax instruments with the inclusion of the net imputed rent in the taxable income.

Graph 2: Share of gainers and losers per quintile when imputed rent is treated as taxable income

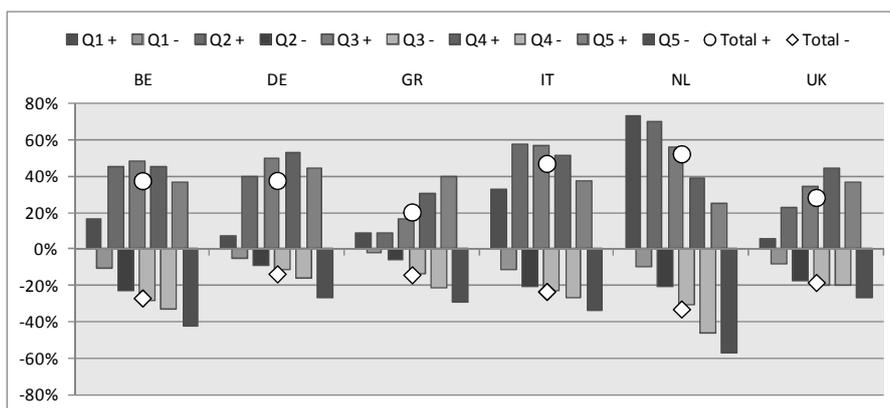
(a) IR1: no revenue neutrality



(b) IR2: revenue neutrality through a proportional tax rebate



(c) IR3: revenue neutrality through a lump sum tax credit



Notes: Gainers and losers defined as households with a percentage variation in extended disposable income equal to $\pm 1\%$. Quintile groups defined on the basis of household equivalised disposable cash income. Source: Own calculations using EUROMOD version D25.

The budgetary neutral scenario IR2 offers a completely different picture (Graph 2b): in Belgium and Italy, losers are more prominent at the lower end of the income distribution, while in Germany, Greece and the Netherlands, the share of losers is higher in the upper end of the income distribution.

With respect to the share of gainers, a similar pattern emerges for all countries: their share increases with income level. In the top quintile, the share of gainers ranges from 40% (Greece) to 60% (Belgium).

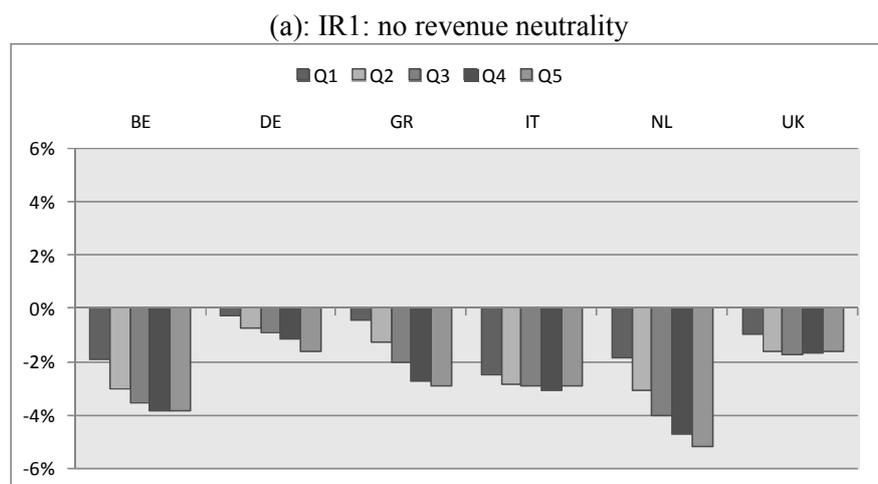
When revenue neutrality is achieved through a lump sum tax credit (budgetary neutral scenario IR3, Graph 2c), the share of losers increases with income in all countries, although less so in the UK. The pattern of gainers is more mixed: in most countries the bottom quintile has relatively few gainers (or losers), since in many countries a considerable proportion of their members have incomes too low to pay personal income taxes. In most countries, gainers are concentrated in the middle of the income distribution. Only in the Netherlands do we find a declining share of gainers when climbing up the income ladder, while an increasing but less pronounced pattern can be observed in Greece.

Another perspective is offered in Graph 3 which reports proportional changes in average extended disposable income per quintile. Graph 3a reports changes in extended disposable income when there is no revenue neutrality (i.e. IR1). In all countries, this policy results in larger reductions of income for higher income groups (except for the top two quintiles in the UK and the top quintile in Italy). This pattern is most pronounced in Belgium, the Netherlands and Greece.

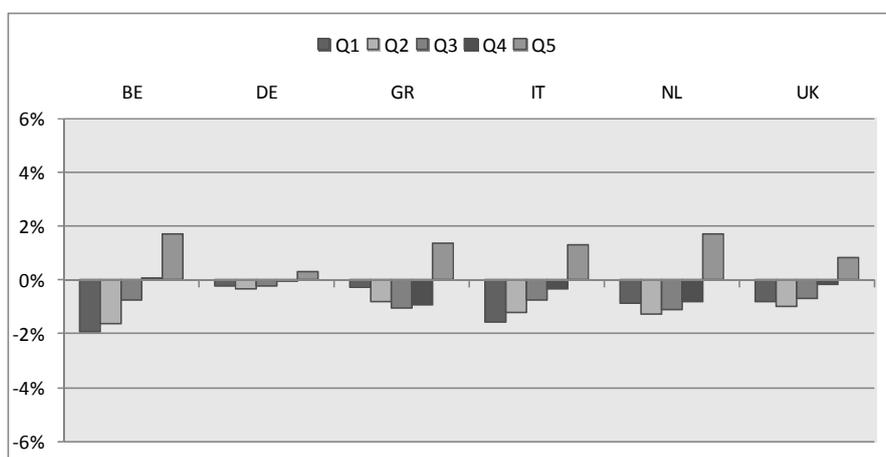
Graph 3b reports the corresponding changes when revenue neutrality is achieved through a proportional rebate in the tax liabilities of all taxpayers (IR2). In general, extended income increases most strongly (around 1% for most countries) in the top quintile, while it declines in the three or four bottom quintiles. In Germany, the changes are not very pronounced.

Graph 3c presents the corresponding changes when revenue neutrality results from a lump sum non-refundable tax credit to everybody with positive tax liability (IR3). The changes are much smaller than those reported in Graph 3b for all countries except the Netherlands where lower income groups gain and higher income groups lose, quite substantially. The extended income of the top quintile declines in all countries (the effect is very small in Greece). In general the middle quintiles gain the most and the effects are very small in the bottom quintile.

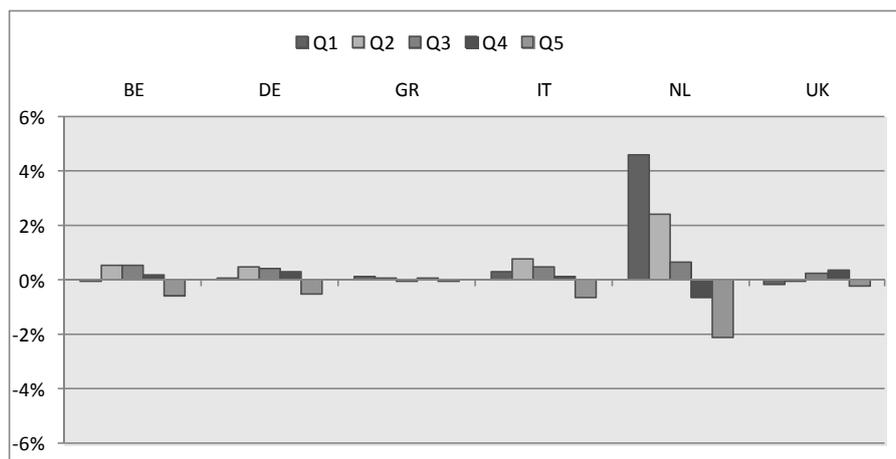
Graph 3: Change in average household disposable extended income per quintile when imputed rent is treated as taxable income



(b) IR2: revenue neutrality through a proportional tax rebate



(c) IR3: revenue neutrality through a lump sum tax credit



Note: Quintile groups defined on the basis of household equivalised disposable cash income. Source: Own calculations using EUROMOD version D25.

Table 5 reports changes from the baseline (distribution of extended disposable income) in three inequality indices – Gini, Atkinson(0.5) and Atkinson(1) – for the three aforementioned scenarios. In

comparison with other indices of inequality, the Gini index is relatively more sensitive to changes in the middle of the distribution, while the Atkinson(0.5) and Atkinson(1) indices are relatively more sensitive to changes close to the top and bottom of the distribution, respectively (Cowell, 2000; Lambert, 2001). Naturally, the distributional outcomes depend on the combination of a number of factors, such as the share of imputed rent beneficiaries in the population and their location in the distribution of disposable income, the progressivity of income taxation and the treatment of mortgage interest payments in the current tax system.

According to the results reported in Table 5, the inclusion of imputed rent in the concept of taxable income (IR1) results in inequality declining in all countries under examination (in comparison with the level of inequality in the distribution of extended income). The effect is strongest in the Netherlands and smallest in the United Kingdom. This is not surprising given the progressivity of the tax schedules in these countries and the regressive pattern of mortgage interest tax relief in the countries where it exists.

Table 5: Proportional changes in inequality when imputed rent is treated as taxable income

		Baseline	Net imputed rent in taxable income, no revenue neutrality (IR1)	Revenue neutrality through a proportional rebate (IR2)	Revenue neutrality through a lump sum tax credit (IR3)
BE	Gini	0.227	-2.1%	2.9%	-1.4%
	Atkinson (0.5)	0.045	-3.5%	6.3%	-2.3%
	Atkinson (1)	0.092	-3.7%	5.8%	-2.0%
DE	Gini	0.270	-1.3%	0.0%	-1.1%
	Atkinson (0.5)	0.059	-2.5%	0.1%	-2.2%
	Atkinson (1)	0.114	-2.4%	0.0%	-1.9%
GR	Gini	0.304	-1.6%	1.4%	-0.4%
	Atkinson (0.5)	0.078	-2.8%	3.3%	-0.8%
	Atkinson (1)	0.150	-2.8%	2.4%	-0.7%
IT	Gini	0.301	-1.2%	1.0%	-1.9%
	Atkinson (0.5)	0.079	-2.0%	2.0%	-3.1%
	Atkinson (1)	0.147	-2.6%	1.5%	-3.1%
NL	Gini	0.248	-2.6%	2.6%	-4.8%
	Atkinson (0.5)	0.051	-4.8%	5.5%	-8.6%
	Atkinson (1)	0.100	-5.0%	4.4%	-8.4%
UK	Gini	0.307	-0.6%	0.9%	-0.6%
	Atkinson (0.5)	0.077	-1.1%	2.0%	-1.1%
	Atkinson (1)	0.143	-1.2%	1.6%	-1.0%

Notes: Baseline refers to the distribution of extended equivalised disposable income. Source: Own calculations using EUROMOD version D25.

In contrast, when we introduce revenue neutrality through a proportional tax rebate (IR2) inequality rises as the benefits, according to Graph 3b, accrue mainly to population members belonging to the top quintile. Since in this scenario most of the changes take place close to the top of the distribution, it is not surprising to observe that the largest increases are recorded when Atkinson(0.5) is used as index of inequality. Again, the largest effects are observed in Belgium and the Netherlands, while the smallest ones in Germany, where the value of the inequality indices barely change as a result of the

policy reform. For Belgium and the Netherlands, this relates to the strong progressivity of the tax system, which in Belgium is partly due to refundable tax credits for low incomes. When revenue neutrality is achieved through a lump sum credit to all taxpayers (IR3), inequality declines irrespective of the index used. The decline is largest in the Netherlands (between -7% and -9% according to the two Atkinson indices) and smallest in the United Kingdom (between -0.7% and -1.1%).

Finally, we investigate the impact of housing taxation on marginal effective tax rates (METRs), that are indicative of the marginal tax burden on labour income. The METR is defined as:

$$METR = 1 - \Delta Y_j / d_i$$

where d_i is the earnings increment for individual i and Y_j is the disposable income of household j to which this individual belongs. The METR is calculated for each working age individual with earnings, taking into account any change in household income after a marginal increase⁹ to each individual's earnings, in turn. The METR gives an insight into the differences in labour incentives implied by each scenario (Immervoll and Sutherland, 2005). Individual METRs are averaged within income quintiles (see Table 6).

When imputed rent is taxed and mortgage interest relief abolished without compensating measures (IR1), the average METR increases in all quintiles. This is due to the progressivity of the systems: the tax base is increased by the inclusion of imputed rent and the removal of mortgage interest relief.

When revenue neutrality is achieved through a proportional tax rebate (IR2), the average METR decreases in comparison with scenario IR1. Since the rebate is proportional to the tax liability, the reduction is higher in the top quintiles. In all countries, the average METR in the top quintile shifts below its baseline value, while the opposite is observed in the bottom of the distribution, except in the Netherlands.

Taxation of IR combined with a lump-sum reduction of tax liabilities (IR3) lowers the average METR relative to the baseline (except in the Netherlands), but does so to a lesser extent than under scenario IR2 and the pattern over the income distribution generally reverses. Relative to the baseline, METRs are generally lower in the bottom quintile but higher or not much changed at the top of the income distribution. Exceptions are the Netherlands, where METRs increase in the bottom quintile, and Greece where, as in scenario IR2, they fall most for those with high household incomes. While in the Netherlands IR3 appears to involve a trade-off between inequality reduction and higher marginal rates, especially for those with high incomes, there are instances in some countries of reductions in the marginal tax burden on labour incomes, especially for low income individuals, potentially reinforcing the day-after favorable distributional impact of housing taxation.

⁹ The increase is 3%, corresponding approximately to an additional hour of full time work per week.

Table 6: Mean METRs, by quintile groups of equivalised disposable income

		Baseline	Net imputed rent in taxable income, no revenue neutrality (IR1)	Revenue neutrality through a proportional rebate (IR2)	Revenue neutrality through a lump sum tax credit (IR3)
BE	Bottom quintile	46.59	49.83	47.34	43.60
	2	56.54	59.14	55.10	55.27
	3	54.91	56.17	51.58	54.13
	4	53.30	53.97	49.47	53.14
	Top quintile	54.05	54.34	49.61	54.18
	All	53.87	54.95	50.54	53.36
DE	Bottom quintile	39.88	40.97	40.54	38.16
	2	43.75	44.16	42.98	42.24
	3	44.50	44.95	43.51	43.74
	4	45.32	45.80	44.11	44.98
	Top quintile	47.55	48.01	45.83	47.68
	All	44.88	45.41	43.86	44.23
GR	Bottom quintile	6.81	8.50	8.03	6.72
	2	14.08	16.80	15.35	13.82
	3	18.69	21.47	19.31	18.50
	4	24.85	27.20	24.14	23.87
	Top quintile	34.22	35.42	30.43	32.86
	All	22.76	24.84	21.93	22.03
IT	Bottom quintile	25.18	26.73	25.15	23.22
	2	35.04	35.76	33.13	33.26
	3	36.72	37.46	34.46	35.72
	4	38.79	39.30	35.97	38.27
	Top quintile	42.01	42.44	38.70	42.02
	All	37.01	37.70	34.65	36.16
NL	Bottom quintile	39.52	40.66	38.95	39.83
	2	37.69	38.15	34.54	37.65
	3	34.67	35.36	31.34	34.94
	4	37.64	38.53	32.80	38.53
	Top quintile	40.44	41.48	33.45	41.36
	All	38.05	38.89	33.65	38.60
UK	Bottom quintile	54.29	56.23	54.97	53.86
	2	51.10	51.57	50.10	49.80
	3	34.49	34.73	33.22	33.38
	4	31.78	32.10	30.47	31.30
	Top quintile	33.85	34.43	32.37	34.15
	All	36.56	37.05	35.33	36.12

Note: Marginal effective tax rates (METRs) are calculated for each working age individual (18-64 included) with positive earnings. Source: Own calculations using EUROMOD version D25.

6 Conclusions

Identifying policy measures able to improve fiscal balances, with no detrimental effects on income inequality and labour market incentives, is particularly valuable in times of economic downturn and fiscal crisis. In a number of countries, tax reforms removing provisions favouring homeownership have been implemented under similar circumstances in the past; for example after the recession of the early 1990s, when some EU countries reduced deductibility of mortgage interest expenses. Currently,

austerity measures adopted in several European countries consider housing taxation as a key ingredient in the corresponding rescue packages.

Homeowners' living standards are arguably higher than those of otherwise similar households, renting comparable accommodation in the private markets, as homeowners do not need to pay for the housing services provided by their accommodation. The value of the net imputed rent they benefit from represents, on average, a non-trivial proportion of their cash income which is typically used as a basis for personal income taxation. Nevertheless, although it has been widely recognised that net imputed rent should be regarded as non cash income enhancing consumption opportunities, and that both equity and efficiency arguments recommend its taxation, in most countries it is still tax-exempt.

When considering the option of taxing imputed rent, one concern is that income inequality might be adversely affected. While consensus on the regressive nature of mortgage interest relief schemes has been reached, there is a concern that imputed rent taxation may not necessarily be progressive; for example, in countries where older people have lower cash incomes than the rest of population.

This paper has investigated the fiscal and distributional consequences of taxing net imputed rent in six European countries (Belgium, Germany, Greece, Italy, the Netherlands and United Kingdom), which vary regarding their housing market characteristics and their joint distribution of housing tenure and cash disposable income. The value of net imputed rent was estimated from nationally representative survey data and the multi-country tax benefit model EUROMOD was used to conduct tax incidence analysis exploring three scenarios.

First, we considered a non revenue-neutral scenario, where net imputed rent was included in the tax base, while housing related tax expenditures (mainly mortgage interest tax relief) and the existing taxation of cadastral income were abolished, with the aim of conducting an absolute tax incidence analysis. The results provide evidence of a small inequality-reducing effect of net imputed rent taxation, which is strongest in the Netherlands and weakest in the United Kingdom, but consistent across countries. At the same time, a non-trivial increase in personal income tax revenues, ranging from about five percentage points in Germany (where a large proportion of the population lives in rented accommodations) to almost thirty percentage points in the Netherlands (due to the abolition of mortgage interest tax relief) is estimated. While additional fiscal revenues, raised without increasing income inequality, are of great interest to several European countries currently facing severe fiscal imbalances, other countries might be more interested in tax reforms capable of shifting the burden away from labour. Results obtained regarding the differential tax incidence analysis of the revenue neutral scenarios have shown how housing taxation could offer a promising avenue in this respect. The way in which the additional tax revenues are returned to taxpayers - through a proportional rebate in tax liability for all taxpayers or through a lump sum non refundable tax credit - turns out to affect crucially the distributional assessment of net imputed rent taxation. Net imputed rent taxation and the

removal of mortgage interest tax relief appear to be pro-rich when accompanied by a proportional tax liability rebate; while a lump-sum credit reduces inequality, with gainers mostly situated in the middle of the income distribution. Marginal effective tax rates on earned income in general increase when imputed rent is taxed, but this effect is largely counteracted in the budget-neutral scenarios. While the proportional tax rebate reduced the marginal burden of tax on labour incomes on average by more than the lump sum rebate, the largest reductions were for people in high income households. The lump-sum tax credit scenario led to a decrease in METRs for people with low household incomes in some countries (Belgium, Germany, Italy), indicating that such a shift in tax burden from labour income to housing might lead to increased labour incentives for these individuals.

From a practical point of view, taxation of net imputed rents would entail several administrative challenges. One would concern the accurate measurement of net imputed rents in practice. Moreover, short term liquidity constraints for homeowners and political economy considerations certainly represent a challenge to implementing net imputed rent taxation. Still, the paper has shown that housing taxation appears to be a promising avenue for raising additional revenues, or lightening taxation of labour, with no inequality side-effects to be envisaged. Our results provide useful insights on the likely fiscal and distributional consequences of following such a route towards a fairer and more neutral definition of the income tax base. Also, they show how cross county variation in housing market characteristics, marginal tax rates and cash income distributions across tenure types are likely to play a paramount role in shaping the fiscal and distributional effects of housing taxation reforms.

References

- Aaberge, R., Bhuller, M., Langørgen, A., Mogstad M., 2010. The Distributional Impact of Public Services when Needs Differ. *Journal of Public Economics* 94(9-10), 549-562.
- Aaron H., 1970. Income Taxes and Housing. *American Economic Review* 60(5), 789-806.
- Andrews, D., Caldera Sánchez A., 2011. Drivers of Homeownership rates in selected OECD countries. OECD Economics Department Working Papers 849, OECD, Paris.
- Andrews, D., Caldera Sánchez, A., Johansson, A., 2011. Housing Markets and Structural Policies in OECD countries. OECD Economics Department Working Papers 836, OECD, Paris.
- Arnold, J.M, Brys, B., Heady, C., Johansson, A., Schweltnus C., Vartia, L., 2011. Tax policy for economic recovery and growth. *Economic Journal* 121, F59–F80.
- Atkinson, A.B., Bourguignon, F., 2000. Introduction: Income Distribution and Economics, in: Atkinson, A.B., Bourguignon F. (eds.) *Handbook of Income Distribution*, Elsevier, Amsterdam and New York.
- Ball, M., 1983. *Housing policy and economic power: the political economy of owner occupation*. Methuen, London.
- Boeri, T., Terrell, K., 2002. Institutional determinants of labour reallocation in transition. *Journal of Economic Perspectives* 16(1), 51-76.
- Bourassa, S.C., Grigsby, W.G., 2000. Income tax concessions for owner-occupied housing. *Housing Policy Debate* 11(3), 521-546.
- Bover, O., Muellbauer, J., Murphy, A., 1989. Housing, wages and UK labour markets, *Oxford Bulletin of Economics and Statistics* 51(2), 97-136.
- Buckley, M., Gurenko, N., 1997. Housing and income distribution in Russia: Zhivago's Legacy. *World Bank Observer* 12(1), 19-32.
- Cameron, G., Muellbauer J., 1998. The housing market and regional commuting and migration choices, *Scottish Journal of Political Economy* 45(4), 420-446.
- Canberra Group, 2001. *Expert Group on Household Income Statistics: Final Report and Recommendations*. Ottawa.
- Catte, P., Girouard, N., Price, R., André, C., 2004. *Housing Markets, Wealth and the Business Cycle*, OECD Economics Department Working Papers 394, OECD, Paris.
- Ceriani, V., Manestra, S., Ricotti, G., Sanelli, A., Zangari, E., 2011. The tax system and the financial crisis. *Bank of Italy Occasional Paper* 85.
- Cowell, F.A., 2000. Measurement of inequality, in: Atkinson, A.B., Bourguignon, F. (eds.) *Handbook of Income Inequality I*, 87-166, North Holland, Amsterdam.
- Di Pasquale, D., Glaeser E., 1999. Incentives and Social Capital: Are Homeowners Better Citizens?. *Journal of Urban Economics* 45(2), 354-384.
- Frick, J.R., 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), 513-537.
- Frick, J.R., Goebel, J., Grabka, M.M., 2007. Assessing the distributional impact of 'imputed rent' and 'non-cash employee income' in micro data: Case study based on EU-SILC (2004) and SOEP (2002). *SOEP Paper* 2, DIW, Berlin.
- Frick, J.R., Grabka, M.M., Smeeding, T., Tsakloglou, P., 2010. Distributional effects of imputed rents in five European countries. *Journal of Housing Economics* 19(3), 167-179.
- Garner, T.I., Short, K., 2009. Accounting for owner-occupied dwelling services: Aggregates and distributions. *Journal of Housing Economics* 18 (3), 233-248.
- Gasparini, L., Escudero, W.S., 2004. Implicit Rents from Own-housing and income distributions: Econometric estimates from Greater Buenos Aires. *Journal of Income Distribution* 12(1-2), 32-55.
- Glaeser, E., 2010. Housing policy in the wake of the crash, *Daedalus* 139(4), 95-106.
- Goode, R., 1960. Imputed rent of owner-occupied dwellings under the income tax. *Journal of Finance* 15(4), 504-530.
- Haig, R.M., 1921. *The Concept of Income – Economic and Legal Aspects*, in: R.M. Haig (ed.) *The Federal Income Tax*. Columbia University Press, New York.
- IMF, 2009. *Debt bias and other distortions: Crisis-related issues in tax policy*. Prepared by the IMF Fiscal Affairs Department, June 12, 2009.
- Immervoll, H., Sutherland, H., 2005. EUROMOD: An Integrated European Tax-Benefit Model and Indicators of Work Incentives, in Garone, G., Salomaki, A. (eds) *Indicators and Policies to Make Work Pay*. Special Report No 2. Office for Official Publications of the EC.
- Johansson, A., Heady, C., Arnold, J., Brys, B., Vartia, L., 2008. Tax and economic growth. OECD Economics Department Working Papers 620, OECD, Paris.
- Kiel, K. A., Zabel, J. E., 1999. The accuracy of Owner-Provided House Values: The 1978-1991 American Housing Survey, *Real Estate Economics* 27(2), 263-298.

- Kneller, R., Bleaney, M.F., Gemmell N., 1999. Fiscal policy and growth: evidence from OECD countries, *Journal of Public Economics* 74(2), 171–190.
- Lambert, P.J., 2001. *The distribution and redistribution of income: A mathematical analysis*, 3rd edition, Manchester University Press, Manchester.
- Lerman, D.L., Lerman, R.I., 1986. Imputed income for owner-occupied housing and income inequality, *Urban Studies* 23(4), 323-331.
- Lloyd, G., 2009. *Moving beyond the crisis: using tax policy to support financial stability*, mimeo, OECD.
- Marquier, R., 2003. *Imputation de loyers fictifs aux propriétaires occupants: Quel impact sur les contours de la population pauvre?* Institut national de la Statistique et des Études Économiques, Décembre 2003.
- Marsh, D.B., 1943. The taxation of imputed income, *Political Science Quarterly* 58(4), 514-536.
- Matsaganis, M, Flevotomou M., 2007. The impact of mortgage interest tax relief in the Netherlands, Sweden, Finland, Italy and Greece, EUROMOD Working Paper 2/07, University of Essex.
- Meulemans, B., Cantillon, B., 1993. De geruisloze kering: de nivellering van de intergenerationele welvaartsverschillen, *Economisch en Sociaal Tijdschrift* 47(3), 421-448.
- Mirrlees, J., Adam, S., Besley, T., Blundell, R., Bond, S., Chote, R., Gammie, M., Johnson, P., Myles G., Poterba J., (eds), 2011. *Tax by Design: the Mirrlees Review*. Oxford University Press, Oxford.
- Musgrave, R.A., 1967. In defence of an income concept. *Harvard Law Review* 81(1), 44-62.
- OECD, 2011. *Divided we Stand: Why Inequality Keeps Rising*. OECD Publishing, Paris.
- Onrubia, J., Rodado, M.C., Ayala, L., 2009. How do services of owner-occupied housing affect income inequality and redistribution?. *Journal of Housing Economics* 18 (3): 224-232.
- Paulus, A., Sutherland H., Tsakloglou, P., 2010. The distributional impact of in kind public benefits in European countries. *Journal of Policy Analysis and Management* 29(2), 243–266.
- Pellegrino, S., Turati, G., 2012. Reducing the tax wedge on labour income by reforming housing taxation: Can this reform achieve a political majority?, forthcoming in *Giornale degli Economisti e Annali di Economia*.
- Poterba, J.M., 1992. Taxation and Housing: Old questions, new answers. *American Economic Review* 82(2), 237-242.
- Rosen, H.S., 1979. Owner occupied housing and the federal income tax: Estimates and simulations. *Journal of Urban Economics* 6(2), 247-266
- Saunders, P., Siminski, P.M., 2005. Home Ownership and Inequality: Imputed Rent and Income Distribution in Australia. *Economic Papers of the Economic Society of Australia* 24(4), 346-367.
- Saunders, P., Smeeding, T., Coder, J., Jenkins, S., Fritzell, J., Hagenaaars, A., Hauser, R., Wolfson M., 1992. *Non-cash Income, Living Standards, Inequality and Poverty: Evidence from the Luxembourg Income Study*, Discussion papers 35, Social Policy Research Centre (SPRC), University of New South Wales.
- Simons, H., 1938. *Personal Income Taxation: the Definition of Income as a Problem of Fiscal Policy*. University of Chicago Press, Chicago.
- Skinner, J., 1996. The dynamic efficiency cost of not taxing housing. *Journal of Public Economics*, 59(3): 397-417
- Smeeding, T., Saunders, P., Coder, J., Jenkins, S., Fritzell, J., Hagenaaars, A., Hauser, R., Wolfson M., 1993. Poverty, inequality, and family living standards impact across seven nations: the effect of noncash subsidies for health, education and housing. *Review of Income and Wealth* 39(3), 229-256.
- Sutherland, H., 2007. EUROMOD: the tax-benefit microsimulation model for the European Union, in Gupta, A., Harding, A. (eds.) *Modelling our future: population ageing, health and aged care*. International Symposia in Economic Theory and Econometrics, Elsevier.
- Turnovsky, S.J., Okuyama, T., 1994. Taxes, housing, and capital accumulation in a two-sector growing economy, *Journal of Public Economics* 53(2), 245-267.
- Vickrey, W., 1993. Today's task for economists. *American Economic Review* 83(1), 1-10.
- Wood, G.A. (1990). The Tax Treatment of Housing: Economic Issues and Reform Measures. *Urban Studies* 27(6), 809-830.
- Yates, J., 1994. Imputed Rent and Income Distribution, *Review of Income and Wealth* 40(1), 43-66.