

EUROMOD WORKING PAPER SERIES

EM 17/20

An Assessment of Wealth Taxes in a Joint Income-Wealth Perspective

Sarah Kuypers, Francesco Figari and Gerlinde Verbist

October 2020



An assessment of wealth taxes in a joint income-wealth perspective*

Sarah Kuypers ^a

Francesco Figari ^b

Gerlinde Verbist ^a

^a Herman Deleeck Centre for Social Policy, University of Antwerp

^b University of Insubria and ISER, University of Essex

Abstract

Many researchers and policymakers have made strong arguments for broadening the taxes on wealth and its returns. Although the theoretical literature on (optimal) wealth taxation is growing, there exists a large void in empirical research. This paper addresses this void by analysing the redistributive and budgetary impact of wealth taxes in six European countries using the perspective of the joint distribution of income and wealth. We use data from the Eurosystem Household Finance and Consumption Survey (HFCS) and EUROMOD. We show that existing wealth taxes do not achieve any significant redistribution. Although they are in most cases strongly progressive, the low redistributive effect is mainly due to their small size. Moreover, there is a lack of neutrality in the tax system with regard to the source from which households draw their financial living standard: income or wealth. Hence, existing wealth taxes score badly on both vertical and horizontal equity grounds.

JEL: C15, D31, H23, H24

Keywords: redistribution, income tax, wealth tax, microsimulation

Corresponding author:

Sarah Kuypers

sarah.kuypers@uantwerpen.be

* The authors acknowledge funding from the Joint Research Centre, Directorate B, Growth and Innovation – Fiscal Policy Analysis (B2, Sevilla) of the European Commission (Tender JRC/SVQ/2015/J.2/0005/NC). Sarah Kuypers and Gerlinde Verbist also acknowledge financial support from the Belgian Science Policy Office (BELSPO) under contract BR/121/A5/CRESUS. In this paper we make use of EUROMOD version H1.0 and microdata from the Eurosystem Household Finance and Consumption Survey (HFCS - UDB 2.0 version). EUROMOD is maintained, developed and managed jointly by the Institute for Social and Economic Research (ISER) at the University of Essex and the Joint Research Centre of the European Commission, in collaboration with national teams from the EU member states. We are indebted to the many people who have contributed to the development of EUROMOD. The process of extending and updating EUROMOD is financially supported by the European Union Programme for Employment and Social Innovation 'Easi' (2014-2020). The results published and the related observations and analysis may not correspond to results or analysis of the data producers.

1 Introduction

Before the Great Recession of 2007 wealth taxation¹ was mainly studied from an efficiency point of view. Wealth taxation was considered by the literature as non-optimal if it is possible to use non-linear labour income tax (Atkinson & Stiglitz, 1976; Chamley, 1986; Judd, 1985). However, over the last years several studies have criticised the strong hypotheses made in these frameworks and consequently argued in favour of wealth taxation (e.g. Piketty & Saez, 2012; Saez, 2002; Spiritus, 2017). Moreover, in the aftermath of the Great Recession and rising inequality as well as the influential study of Piketty (2014), wealth taxes have received increasing interest in light of their potential budgetary and distributive effects. In the context of fiscal consolidation wealth taxes provide an interesting instrument to increase government revenues and they are often defended based on equity and fairness considerations as they are levied on those with the highest ability to pay. Furthermore, international institutions (e.g. IMF, OECD, European Commission) have recommended several countries to reduce the tax burden on labour by broadening the tax base to wealth.

Nevertheless, there seems to be a general trend towards less rather than more wealth taxation in most countries as shown for instance by the fact that over the last decades the contribution of wealth-related taxes to government revenues has diminished, while at the same time the importance of households' financial and housing wealth has increased substantially. This contradiction is among others due to the fact that many OECD countries have abolished their net wealth tax over the last decades and have cut back the taxation of capital income and wealth transfers (OECD, 2018b). It is often argued that as a consequence of globalisation and increased mobility of capital, issues such as discouraging investment and capital flight have resulted in international tax competition and a race-to-the-bottom (Krenek & Schratzenstaller, 2018). The imbalance between the administrative costs vis-à-vis the limited revenues has also played a major role in the decrease of the taxation of wealth (OECD, 2018b).

These large contradictions between recommendations and real practice make wealth taxation a very interesting research topic. Yet, although the theoretical literature on (optimal) wealth taxation is relatively large and growing, there exists a large void in empirical research. Little is known about how in practice current and proposed alternative wealth taxes (might) affect aspects such as redistribution and inequality, investment and portfolio choices, labour supply, etc. Exceptions include Halvorsen & Thoresen (2019) who study the distributional effects of the Norwegian net wealth tax. Krenek & Schratzenstaller (2018) simulate the potential budgetary and redistributive effects of the introduction of an annual net wealth tax at the EU level. Fuest et al. (2018) and Lawless & Lynch (2016) do the same for Germany and Ireland respectively. An overview of the literature on wealth transfer taxation is provided by Kopczuk (2013). Figari et al. (2017) discuss the taxation of homeownership. A recent study by the OECD (2018a) calculates marginal effective tax rates on household savings. Another very recent strand of literature looks into the behavioural aspects of wealth taxation (e.g. Bülhart et al., 2016; Durán-Cabré et al., 2019; Jakobsen et al., 2020; Seim, 2017; Zoutman, 2015).

¹ Throughout the paper the terms 'wealth taxes' and 'wealth-related taxes' are used interchangeably to denote all types of taxes levied on (parts of) wealth, their transfer and/or their yields. 'Net wealth tax' will be used to denote the annual tax on the stock of net wealth.

This paper contributes to this emerging literature by empirically analysing the equity and budgetary impact of wealth-related taxes. Since it is important to consider wealth taxes within the total tax system (OECD, 2018b) and most countries focus on the taxation of (labour) income, we also adopt an integrated perspective. In particular, we provide a combined assessment of direct taxes on income and wealth against a concept of living standards including both income and wealth resources. To this end we combine data on households' income, assets and liabilities from the Eurosystem Household Finance and Consumption Survey (HFCS) with the EU-wide tax-benefit microsimulation model EUROMOD. The analysis covers six European countries; Belgium, Germany, France, Finland, Italy and Spain, which have different wealth-related taxes in place, differ with regard to their overall tax-benefit system and are characterised by varying income and wealth distributions as well as the correlation between the two.

The contributions of this paper are manifold. First, we provide an overview of the main arguments in favour and against wealth-related taxation and also extend the ability to pay argument, already used in terms of vertical equity, to horizontal equity considerations. In particular we argue that well-being and ability to pay essentially depend on one's position in the joint distribution of income and wealth and that two persons or households with the same position in this distribution should for tax purposes be treated equally irrespective of whether they derive this level primarily from their (labour) income or (annuitized) wealth. We show that wealth taxes in their current form hardly achieve any redistribution, while the burden of personal income taxes is in some countries very high. Hence, there is a strong lack of neutrality in the tax system with regard to the source from which households draw their living standard. Second, we adopt a new, broader framework to evaluate wealth-related taxes, i.e. the joint distribution of income and wealth (see also Kuypers et al., 2019). Hence, in our assessment we take into account how income and wealth are interrelated, an aspect that is often overlooked in the literature. We also take into account the effect of wealth-related taxes from the moment of observation until death, which is important given the fact that the effects of wealth taxation, especially with regard to the decrease of inequality, are much more important in the long-term (Cowell & Van de gaer, 2017; Halvorsen & Thoresen, 2019). Finally, while previous studies often reflected specific case studies, we adopt a cross-country perspective by comparing effects among countries differing in some important aspects. In short, the new empirical evidence provided in this paper provides important insights on the effects of current tax systems and highlights potential new avenues for the future debate on fiscal policies and on innovative tax designs.

The paper is organised as follows. Section 2 provides an overview of the main arguments in favour and against wealth taxation. After the description of the data and methods in Section 3, we then start the empirical analysis in Section 4 by analysing the vertical equity effects of existing wealth-related taxes in the six countries under study. We first analyse wealth taxes against their main tax base, i.e. net wealth and then adopt a more integrated perspective by assessing their redistributive effects against the joint income-wealth framework. In Section 5 we look into the horizontal inequity between the taxation of income and that of wealth. The last section concludes.

2 Arguments in favour of and against wealth taxation

One of the main recommendations in the traditional literature on optimal taxation was that capital income, and by extension wealth and its transfer², should not be taxed if there is a non-linear tax on labour income. The classical Atkinson-Stiglitz model (Atkinson & Stiglitz, 1976) and Chamley-Judd model (Chamley, 1986; Judd, 1985) both imply that any form of wealth taxation is non-optimal because it distorts savings preferences without achieving any welfare improvement compared to the non-linear labour tax. Recently, however, arguments in favour of wealth taxation have increased substantially, even though some of the main concerns are legitimate and still remain to be addressed. Table 1 provides a brief (non-exhaustive) overview of the main arguments in favour of and against wealth taxation as well as some potential responses to the latter.

Table 1: Overview arguments in favour of and against wealth taxation

	Arguments in favour	
Equity-related	<ul style="list-style-type: none"> • Increasing inequality • Decreasing redistribution • Ability to pay • Horizontal inequity between wealth and income • Equality of opportunity 	
Efficiency-related	<ul style="list-style-type: none"> • Bring down public debt • Preserve tax revenues in the future • Wealth concentration harms growth 	
	Arguments against	Potential response to arguments
Equity-related	<ul style="list-style-type: none"> • Double taxation 	<ul style="list-style-type: none"> • Almost never full double taxation, tax utility derived from ownership
	<ul style="list-style-type: none"> • Inheritance tax = tax on grief 	<ul style="list-style-type: none"> • Unmerited advantage
	<ul style="list-style-type: none"> • Liquidity constraints 	<ul style="list-style-type: none"> • Payments in instalments
Efficiency-related	<ul style="list-style-type: none"> • Valuation issues 	<ul style="list-style-type: none"> • Use insured values, existing valuations, fixed valuation for few years
	<ul style="list-style-type: none"> • Cost of tax administration 	<ul style="list-style-type: none"> • Improvements in technology
	<ul style="list-style-type: none"> • Discouraging financial investment 	<ul style="list-style-type: none"> • Incentive for productive use of wealth
	<ul style="list-style-type: none"> • Tax avoidance & evasion 	<ul style="list-style-type: none"> • Third party reporting & Automatic exchange of information
Other	<ul style="list-style-type: none"> • Political feasibility 	

Source: Own summary

The largest set of arguments in favour of wealth taxation relates to equity considerations. A first group focuses on levels of inequality. Recently several studies have provided evidence that both income and wealth inequality have been on the rise in most OECD countries since the 1980's (Alvaredo et al., 2018; OECD, 2015, 2011, 2008). The ownership of wealth is highly concentrated, with the top 10% wealthiest households now holding on average about 50 percent of total wealth (OECD, 2015). Reductions in wealth inequality in the past have been mainly associated with external factors such as wars, revolutions, epidemics, stock-market crashes, etc. (Milanovic, 2016; Scheidel, 2017; Scheve & Stasavage, 2016). Yet, the distribution and concentration of wealth is in the first place driven by natural, systematic mechanisms, which cover both market and non-market forces (Cowell & Van de

² See for instance Kaplow (2001) and Kopczuk (2001) for an extension to wealth transfer taxation.

gaer, 2017). The first can take the form of faster growth of the return to wealth than economic output ($r > g$) (Piketty, 2014), Kuznets waves (Milanovic, 2016) or some other mechanism, while non-market forces mainly refer to the union of wealth through marriage and its division through bequests (Cowell & van de gaer, 2017). Through policies such as taxes and benefits governments may intervene into these systematic processes. Yet, evidence indicates that the progressivity of the total tax-benefit system has weakened over time (Immervoll & Richardson, 2011; Piketty & Saez, 2007) and its redistributive efforts are also considerably smaller when assessed against the framework of the joint distribution of income and wealth (Kuypers et al., 2019, 2020 forthcoming). As wealth is more unequally distributed than income, wealth taxation could be considered an interesting way to reduce overall inequality.

A second group of arguments reflects the relationship of wealth with income as the current main tax base. It is argued that income understates a person's or household's well-being and ability to pay. Indeed, savings and assets also contribute to one's socio-economic well-being and this in a number of ways. First, wealth increases consumption possibilities through the generation of capital income, and this without having to sacrifice leisure (McDonnell, 2013). Yet, when income is insufficient the level of wealth itself also contributes to consumption possibilities through precautionary and life-cycle savings. Furthermore, the mere ownership of wealth also increases utility because it creates independence and opens up a wider range of free choice (McKernan et al., 2012; Sherraden, 1991). Finally, wealth is an important contributor to achieving or maintaining class status (Keister, 2000; Spilerman, 2000) as well as having economic and political power (Cowell & Van Kerm, 2015). Given these important contributions of wealth to well-being it has been considered fair to include it in the tax base (Iara, 2015; Meade, 1978). These contributions also imply that a person's or household's ability to pay depends on both income and wealth, and in some cases wealth can even be regarded as better reflecting true ability to pay. For the wealthy it is for instance often hard to determine income flows. Moreover, income can fluctuate quite strongly from year to year, again especially for the very wealthy. Just because they earned a low income in a particular year generally does not mean they suddenly cannot afford to pay taxes. In contrast, the burden of paying off large amounts of debt may in fact decrease the ability to pay taxes. Hence, the fairness of the tax system can be improved through wealth taxation because it addresses both vertical and horizontal equity considerations. Most of the literature focuses on the vertical equity argument arguing that those who own large wealth should pay higher taxes than those who have low or no wealth. In this paper we push the argument further by also taking into account horizontal equity considerations. We argue that well-being and ability to pay essentially depend on one's position in the joint distribution of income and wealth (Kuypers et al., 2019, 2020 forthcoming); i.e. we account for income and wealth as well as their correlation. Two persons or households with the same position in the joint income-wealth distribution are considered to have a similar level of well-being and ability to pay and hence should for tax purposes be treated equally irrespective of whether they derive this level primarily from their income or wealth.

An argument specifically related to wealth transfer taxation is that of equality of opportunity. Indeed, bequests are one of the most important factors underlying the increasing levels of wealth inequality (Piketty, 2014, 2011; Piketty & Zucman, 2015). A relatively large share of people receives bequests at some point in their life and although they can in principle reduce inequality because they represent a larger proportion of poor households' current wealth levels, bequests are generally found to exacerbate wealth inequality because their size increases with wealth levels (Cowell et al., 2017).

Hence, those receiving large bequests get an important and unmerited head start in life. This has been considered unfair which paves the way for inheritance and gift taxation.

In the aftermath of the sovereign debt crisis also arguments related to government revenues have been raised. Currently most countries generate little revenues through their existing wealth taxes (see section 3.2), such that their abolishment may have a relatively low impact on budgets (Boadway et al., 2010; Kopczuk, 2013). Yet, so far the very wealthy have hardly contributed their share in budget consolidation after the crisis (Krenek & Schratzenstaller, 2018). Given the fact that stabilisation policies have mainly benefited asset values, while austerity increased the burden on labour and transfer incomes, wealth taxation is interesting as it extends the notion of ability to pay to the costs of the crisis (Iara, 2015). Wealth taxes are indeed considered to be a useful instrument to consolidate government budgets in times of crisis as shown by the reintroduction of the annual net wealth tax in Spain and Iceland. Also one-time capital levies are considered to be particularly useful to raise considerable revenues, for instance to bring down public debt (Bach et al., 2014; IMF, 2013). Moreover, the fact that wealth is likely to become increasingly more important than income, also implies that the current primary tax base (i.e. income) may erode in the future, such that wealth taxation may be needed to preserve government revenues. Finally, Krenek & Schratzenstaller (2018) argue in favour of an annual net wealth tax levied at the level of the European Union with the main aim to make the EU's own budget more sustainable.

Although equity and revenue considerations inspire the main claims in favour of wealth taxation, it is also increasingly argued that it would be good from an efficiency point of view. Various studies have criticised the strong hypotheses made in the classical optimal tax literature, especially with regard to the assumption that individuals only differ in their labour earning abilities, implying that wealth inequality would only originate from income inequality (Bastani & Waldenström, 2020). Several authors have shown that more plausible assumptions such as heterogeneity in multiple dimensions (i.e. different returns to investment, different bequest probabilities, ...) rather point towards non-zero taxation of wealth (e.g. Piketty & Saez, 2012; Saez, 2002; Spiritus, 2017). Furthermore, it has been argued that a too large concentration of wealth has a detrimental impact on economic growth (Bagchi & Svejnar, 2015; Stiglitz, 2016) and overall macro-economic stability (Godar et al., 2015; Iara, 2015). In this context wealth taxation is needed to put a halt to the systematic mechanisms of perpetuating and increasing wealth concentration. Hence, these arguments imply that the efficiency versus equity trade-off in wealth taxation may in fact be attenuated (Krenek & Schratzenstaller, 2018).

Even though the arguments in favour of wealth taxation are numerous, there are also several arguments against (more) wealth taxation. First, there are several technical arguments such as difficulties with the valuation of non- or infrequently traded asset types or the cost of tax administration. Although empirical evidence is scarce, recent progress in information and communication technology may somewhat reduce these challenges (Krenek & Schratzenstaller, 2018; Iara, 2015). For the valuation of assets such as jewellery or artwork insured values could be used (OECD, 2018b). Saez & Zucman (2019) argue that the government should simply create a market for assets that have no clear value. Moreover, costs could be reduced by using the same valuations in the different wealth taxes and/or to treat the value of (particular) assets fixed for a few years (McDonnell, 2013).

A more intrinsic and very popular objection towards wealth taxation refers to the fact that for a large part wealth is the result of saved income and bequests which have already been taxed under the personal income tax and inheritance & gift tax respectively. Moreover, certain asset types also generate an income stream which is likewise taxed as capital income. As a counterargument one could argue that this issue of 'double (or even triple) taxation' is not confined to wealth taxes; also in the case of consumption taxes a tax is paid on goods and services which are bought using already taxed income (Boadway et al., 2010; OECD, 2018b). In general there seems to be more opposition towards the first than the latter, while in the case of wealth taxation the burden mainly falls on the wealthy compared to the poor in the case of consumption taxes. Furthermore, it almost never consists of full double taxation, i.e. tax bases typically do not correspond perfectly. For instance, capital gains are in a lot of countries not taxed or only when accrued and only those assets that are held until death are taxed both under a general net wealth tax and the inheritance tax (Boadway et al., 2010). Yet, even if one would agree with the argument of double taxation, wealth taxation remains defensible by the fact that the mere ownership of assets provides utility to its owner(s) and it is considered fair to tax this utility (Iara, 2015; Meade, 1978).

A frequent objection to wealth taxation relates to liquidity constraints, i.e. the fact that households with high wealth may have little income or cash wealth to pay their tax bill. Although this argument is often used, it can be relatively easily refuted as financial wealth is largely concentrated at the top of the distribution. Since financial wealth is much more liquid than real estate, which is generally held by the middle class, the wealthiest households should in general not be more constrained in terms of liquidity than other households. In the cases they do have little income or cash, it is usually because they choose to organise their wealth in illiquid forms (Saez & Zucman, 2019). Perhaps only in the case of high valued small businesses liquidity may be a problem. In that case the wealth tax could be paid in kind (e.g. with shares of the business) (Saez & Zucman, 2019) or in instalments (OECD, 2018b).

Another issue is the fact that it may be politically very difficult to introduce or increase wealth taxes as they are often very unpopular and the wealthiest often have significant political influence. Inheritance taxation is one of the least popular taxes as it is sometimes labelled as a 'death tax' or a 'tax on grief' and prevents the deceased from 'living on' through the bequest to their children (Masson, 2015). It is also often argued that people should have the right of autonomy with respect to what they do with their own acquired property (Rakowski, 2006). The latter may be a valid argument from the perspective of the donor. Yet, in most countries inheritance taxes fall on the recipients for whom the inherited wealth is an unmerited advantage.

The most important arguments against wealth taxation probably relate to economic efficiency. Wealth taxes are argued to distort financial investment, entrepreneurship and risk-taking (in a closed economy) and to cause capital flight (in an open economy). Tax evasion and avoidance is another potential consequence of increased wealth taxation, which implies that it may in practice generate little revenue and might have negative equity effects as the wealthy are more able to use these techniques. Unfortunately, the literature on the elasticity of taxable wealth is still relatively small. Yet, evidence provided by Brülhart et al. (2016), Durán-Cabré et al. (2019), Seim (2017) and Zoutman (2015) indicates that the effects on actual behaviour (i.e. a lower overall level of investment or a reconfiguration of asset portfolios) are rather limited, while there is a much stronger effect on wealth reported to tax authorities (due to tax evasion). Hence, wealth taxation generally does not affect the

actual accumulation of wealth, but rather results in tax dodging (Saez & Zucman, 2019). The volume of wealth hidden in tax havens is indeed very large (e.g. Alstadsæter et al., 2018; Zucman, 2015, 2013).

A possible reply against the discouragement of financial investment is the fact that the taxation of wealth might provide an incentive for wealth holders to seek the best possible return for their investments which is generally achieved through a more productive use of wealth. In other words, in order to be able to pay the tax inefficient investors have the choice between selling some of their wealth to more dynamic investors or to become more dynamic investors themselves, which is likely to have a positive effect on economic growth (Güvenen et al., 2019; McDonnell, 2013; Piketty, 2014). Moreover, since human capital is exempted from wealth taxation, a tax on wealth lowers the net return on tangible capital relative to the return on human capital. This provides an incentive to invest in human capital, which is again beneficial for growth (OECD, 2018b). Furthermore, it could be argued that the negative effects of capital flight and tax evasion call for restraining these possibilities through an adequate tax design and the strengthening of international cooperation and coordination rather than the abolishment of wealth taxation altogether (Cremer & Pestieau, 2011; Krenek & Schratzenstaller, 2018; Piketty, 2014). Indeed, by relying on third party reporting and the international exchange of information evasion possibilities can be largely curbed. Regarding the latter important progress has been made over the last years on moving towards the automatic exchange of information rather than on request alone. Important landmarks include the EU council directives of 2003 and 2011, the US Foreign Account Tax Compliance Act (FATCA) and the OECD/G20 Common Reporting Standard (OECD, 2018a). However, it is important to note that the restriction of avoidance and evasion possibilities might potentially increase the impact on actual investment behaviour, as a last resort to decrease tax liabilities (OECD, 2018b).

Even among those who agree that wealth should be taxed there remains considerable disagreement on how to do so. Most importantly this reflects the type of tax to be used; i.e. taxing the income generated by wealth, the gains accrued on wealth, the possession of wealth or the transfer of wealth.³ The arguments listed in Table 1 may be applicable in different degrees such that from an efficiency, equity and/or revenue point of view different options may be preferred.

First, from an efficiency point of view capital income taxes are generally preferred over net wealth taxes because they are less distortive and less administratively costly (OECD, 2018b). Yet, in most countries capital income is taxed separately from labour and other income, generally against a flat tax rate and with large exemptions (Förster et al., 2014; OECD, 2018a, 2018b). Furthermore, there are several asset types which do not generate any income such as jewellery, artworks and other collectables, and in most countries also imputed rent is tax exempt. Furthermore, capital income taxes could be avoided by incorporating investments or the return to capital could be left accumulating in trust funds. In other words, capital income often does not reflect the full level of ability to pay because not all assets generate an income and because the utility derived from other functions of wealth are not taken into account.

³ Even increased VAT or excise duties on luxury goods are considered as policy options to increase the taxation of the wealthy (Krenek & Schratzenstaller, 2018). Furthermore, an alternative way to include wealth considerations would be through wealth-testing to determine tax liability for the income tax and/or social benefit entitlements (OECD, 2018b). These options are outside the scope of this paper.

Moreover, capital income taxation by itself is not sufficient to reduce overall inequality levels as the wealthiest households will still add post-tax returns to investments to the principal wealth level (OECD, 2018b). The fact that wealth inequality is more strongly driven by inherited wealth than self-made wealth (Piketty & Zucman, 2015) argues in favour of combining it with inheritance and gift taxation. Indeed, a combined system of capital income (including capital gains) taxation and inheritance taxation addresses both market and non-market processes of wealth concentration (cfr. Cowell & Van de gaer, 2017) and is often considered the preferred option to wealth taxation. If such a comprehensive system is well-designed there are only limited reasons to have a net wealth tax on top of it (OECD, 2018b).

Yet, there are arguments to have a net wealth tax when this system is less well-designed, which is arguably the case in most countries (OECD, 2018b). Yunker (2010) argues that inheritance taxation has an effect in the long run only if the initial starting point is a scenario of relative equality. When wealth inequality has already reached a high level, inheritance taxation by itself becomes ineffective in reducing this level. However, an annual wealth tax, even at relatively low rates, may be highly effective even when wealth inequality is already very high (OECD, 2018b; Yunker, 2010). Furthermore, self-made fortunes are not necessarily the result of hard work and also largely depend on asset prices and luck (Yunker, 2010). Combined with the fact that the mere ownership of assets provides utility to its owner(s) above and beyond the income stream it generates argues in favour of an annual net wealth tax. Piketty et al. (2013) argue that we need a combination of taxes on (capital) income, inheritance and net wealth. In a similar vein Atkinson (2015) included all three types of taxes in his list of proposals for a more equal society. Moreover, from an efficiency point of view Guvenen et al. (2019) find that an optimal tax system with a net wealth tax yields higher welfare than the one with capital income tax.

3 Data & methods

Despite the renewed interest in wealth taxation, empirical studies looking into the budgetary, redistributive and incentive effects of wealth taxes are still rare. Microsimulation modelling presents one interesting approach towards these issues. Yet, although there is an increasing literature on the impact of personal income taxation using microsimulation techniques (see e.g. Immervoll & Richardson, 2011; Piketty & Saez, 2007; Verbist & Figari, 2014), there remains an important void with regard to the taxation of wealth. This is largely due to the fact that the policy scope of microsimulation models largely relies on the underlying dataset. Administrative tax data generally do not cover all the information necessary because most countries do not have a general wealth register and most asset types are tax exempt such that they should not be reported to the tax authorities. For a long time survey data also hardly covered any information on savings and asset accumulations. Yet, this has changed recently with the launch of new initiatives such as the Luxembourg Wealth Study (LWS) and the Eurosystem Household Finance and Consumption Survey (HFCS). In this paper we take advantage of the latter by transforming it into the underlying database for the EU-wide microsimulation model EUROMOD. In Section 3.1 we introduce the HFCS data and how it is used in EUROMOD. A brief overview of the existing wealth taxes that we consider, their budgetary impact and how they are simulated is provided in Section 3.2. Finally, in Section 3.3 we explain the approach used to evaluate wealth taxes in Sections 4 and 5.

3.1 HFCS data and EUROMOD

The Eurosystem Household Finance and Consumption Survey (HFCS) is a relatively new dataset covering detailed household wealth, gross income and consumption information. We use information from the second HFCS wave on six countries: Belgium, Finland, France, Germany, Italy and Spain. An overview of their data reference periods and sample sizes is provided in Table 2. The choice of these countries is interesting for several reasons. First, there are important differences in their income and wealth distributions as well as the correlation between the two (Arrondel et al., 2014). They also represent a broad range of tax-benefit systems in which wealth taxation currently plays different roles of importance (see section 3.2), but which has emerged quite often in the public debate over the last years. They are EU member states with well-developed housing markets, thus presenting good cases for the analysis of housing wealth which is a major component of most households' wealth.

Table 2: Overview of reference periods and sample sizes

Country	Reference period		Sample size	
	Wealth	Income	Households	Individuals
Belgium	Time of interview	2013	2,238	5,200
Finland	31/12/2013	2013	11,030	27,142
France	Time of interview	2014	12,035	28,845
Germany	Time of interview	2013	4,461	10,201
Italy	31/12/2014	2014	8,156	19,366
Spain	Time of interview	2010	6,106	15,852

Source: HFCN, 2016

The HFCS dataset contains some interesting features. In terms of the analysis in this paper, it is particularly interesting that the HFCS oversamples the very wealthy to obtain a better coverage of the top of the wealth distribution, and hence of wealth taxes. This is necessary because there exist large sampling and non-sampling errors as a consequence of the large skewness of the wealth distribution. In particular the wealthiest households are less likely to respond and more likely to underreport, especially in the case of financial assets (Davies et al., 2011). Bover (2008) and Kennickell (2008) argue that on top of its correction for nonresponse oversampling of the wealthy also provides more precise estimates of wealth in general and of narrowly held assets as standard errors are much smaller. Table 3 shows for each of our six selected countries the criteria that are used to oversample the wealthy and the effective oversampling rates that are reached. There is no oversampling strategy used in the Italian HFCS, but the final sample still represents 8 per cent more of the top 10% wealthiest households compared to their share in the population.

Table 3: Overview of oversampling criteria and effective oversampling rates of the wealthy

Country	Oversampling top 10%	Oversampling criteria
Belgium	59 per cent	Average regional taxable income and housing prices
Finland	80 per cent	Personal taxable income and socio-economic status from population register
France	132 per cent	Wealth
Germany	141 per cent	Taxable income of municipalities or street sections in large municipalities
Italy	8 per cent	No oversampling
Spain	234 per cent	Taxable wealth of individuals

Notes: "Oversampling top 10%": $(S90 - 0.1)/0.1$, where S90 is the share of sample households in the wealthiest 10%. Wealthiest households are defined as having higher net wealth than 90% of all households, calculated from weighted data.

Source: HFCN, 2016

EUROMOD is a tax-benefit microsimulation model covering all 28 countries of the European Union within a harmonised framework. In its standard form it simulates cash benefit entitlements, personal income tax liabilities and social insurance contributions on the basis of the policy rules in place and information taken from an underlying database. Market incomes as well as tax-benefit instruments which cannot be simulated (generally due to data constraints) are taken directly from the underlying database. EUROMOD usually runs on EU-SILC input data, but is flexible to be combined with other datasets (see for information Sutherland & Figari, 2013).

The benefit of using the HFCS data as the underlying database for EUROMOD is that it covers much more information on households' assets and liabilities than EU-SILC. Furthermore, it allows to convert the original gross HFCS incomes into disposable incomes such that we jointly observe disposable income and net wealth based on the same database. An extensive overview and validation of the HFCS-EUROMOD input dataset can be found in Kuypers et al. (2016 & 2017).

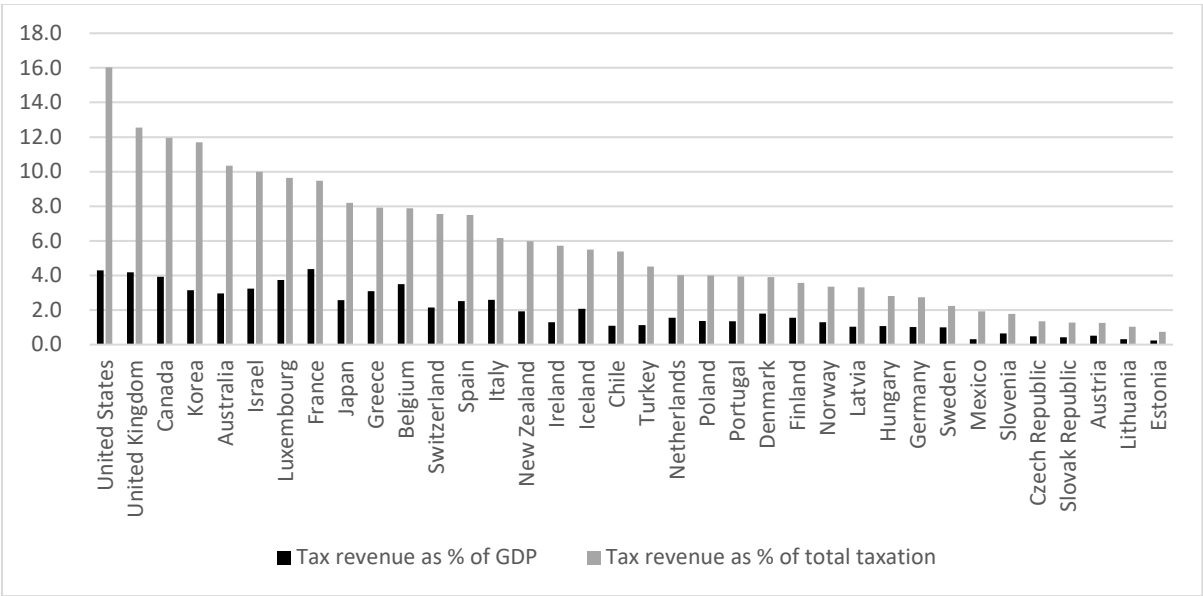
3.2 Wealth taxes and their simulation

Historically taxes on wealth preceded taxes on income, mainly because wealth was highly visible and singularly structured as up until the industrial revolution it mainly consisted of farmland and rural real estate, while after the revolution it was primarily industrial assets. Income, in contrast, was difficult to gauge, even for earners themselves. In most countries top wealth tax rates peaked around the World War period (Scheve & Stasavage, 2016; Piketty, 2014). Yet, since then the importance of wealth taxation has gradually eroded, accelerating in the last few decades mainly due to the increased mobility of wealth which resulted in increased international tax competition and a race-to-the-bottom. Indeed, over the last decades several countries have abolished their net wealth tax: France (2018), Sweden (2007), Luxembourg (2006), Finland (2006), Iceland (2006), Germany (1997), Austria (1995), Denmark (1995). Only Spain, Norway and Switzerland still have a net wealth tax for individuals in place.⁴ Furthermore, many countries have also experienced a reduction in the taxation of capital income and/or inheritances. Capital income is now often taxed separately or at source generally at a proportional and relatively moderate rate (OECD, 2018a). As a consequence the unweighted OECD average statutory capital income tax rate declined from 47 per cent in 1981 to 24 per cent in 2017 (OECD, 2018b). Also inheritance taxation has declined: marginal top tax rates have decreased in all countries but France and Germany, several countries have increased exemptions and some have even repealed them altogether (Australia, Canada and Sweden) (Förster et al., 2014). Today most OECD countries still levy taxes on both income and wealth, but the emphasis clearly lies on the taxation of labour income. As a result wealth tax revenues only represent a minor share of total tax revenues and GDP, as is shown in Figure 1. The Figure also shows that our selection of countries represents a good mix: while France, Belgium, Spain and Italy are among the countries generating relatively high tax revenues, wealth taxes in Finland and Germany hardly contribute to government budgets.

⁴ Luxembourg still has a net wealth tax on corporations. France replaced its general net wealth tax (Impôt de solidarité sur la fortune) with a real estate wealth tax (Impôt sur la fortune immobilière). The Netherlands had an actual net wealth tax in place between 1965 and 2001. In 2001 they introduced a presumptive capital income tax (*Vermogensrendementheffing*) which implicitly still functioned as a net wealth tax. Since 2017 the presumptive rate of return follows actual rates of return, differs among asset types and increases with net wealth. Iceland reintroduced its wealth tax as a temporary emergency measure between 2010 and 2014.

Overall, existing systems of wealth taxation largely focus on the taxation of real estate, while the ownership, transfer and/or return of financial assets is often tax exempt. There are several reasons for the focus on real estate: it typically constitutes the most important component in households’ asset portfolio such that the revenue potential is large, it is highly visible and most countries keep records in a real estate register (while most do not have a general wealth register in place) which restricts possibilities for tax evasion and avoidance and due to its immobile character behavioural responses are limited and therefore less distortive (OECD, 2018b). As shown in Figure 2 these general trends are also found for the six countries considered here. For all countries the highest revenues are achieved through recurrent taxes on the ownership of real estate property. Furthermore, transaction taxes are often also only in place for real estate or taxed at higher rates than transactions of financial capital (OECD, 2018a). Inheritance and gift taxes are relatively important in Belgium and France, while they hardly generate any revenues in Italy. The general net wealth taxes of France and Spain as well as the specific net wealth tax of Belgium all raise 0.5 per cent of the total tax revenue.

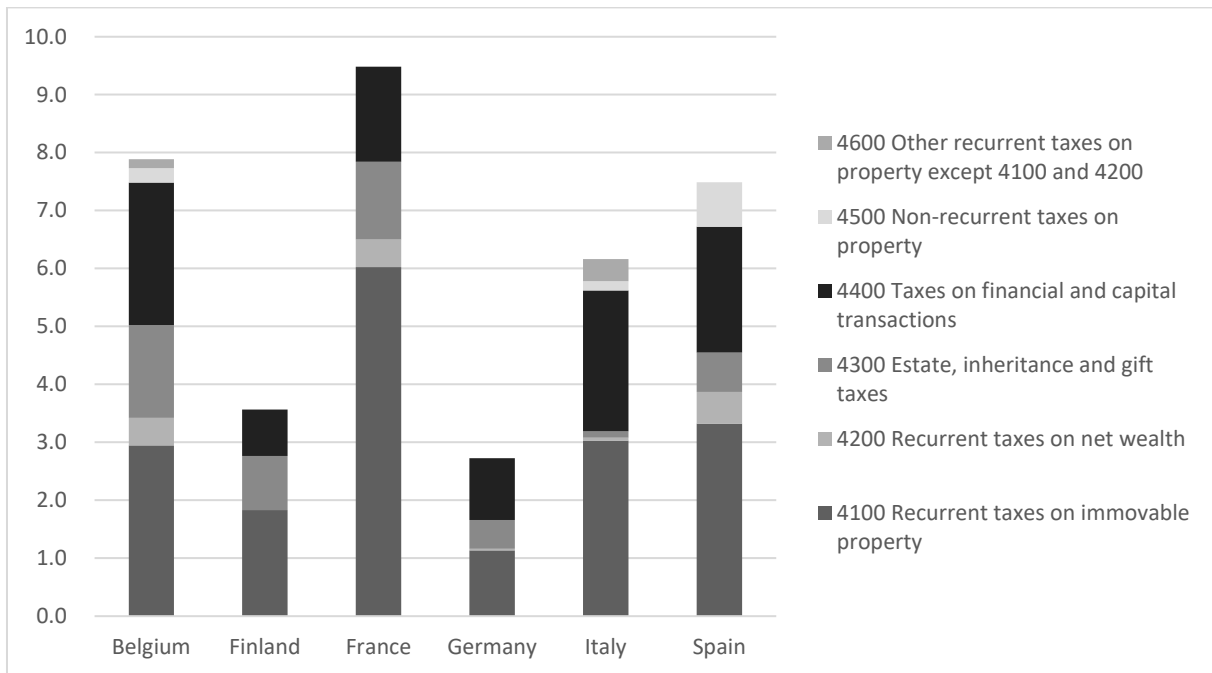
Figure 1: Revenues of wealth taxes as % of GDP and total tax revenues – 2017



Notes: Countries are ranked by highest tax revenue as % of total taxation. Figures include taxes on both individuals and corporations.

Source: OECD Tax Revenue Database

Figure 2: Composition of wealth tax revenue (as % of total tax revenue) – 2017



Note: Figures include taxes on both individuals and corporations.

Source: OECD Tax Revenue Database

An important added value of running EUROMOD on the HFCS data is that it allows to extend the current scope with simulations of existing and hypothetical wealth-related policies. In this paper we focus on the wealth taxes as they existed in 2017 in each of the six countries. Capital income taxes, recurrent real estate taxes, real estate transfer taxes and inheritance and gift taxes, although with a different tax design, exist in all countries considered. A general wealth tax (a tax on all or most types of assets) was in place in France and Spain, while a specific net wealth tax (a tax on specific types of assets) exists in Belgium and Italy. While those countries having a general net wealth often exempt private pensions (OECD, 2018b), Belgium levies a one-time tax on accumulated private pension rights the moment people turn 60. Italy taxes the ownership of bank accounts and financial products. An overview of the main design characteristics of these wealth taxes in each of the countries is provided in Table A.1 to A.5 in the appendix. In several countries there exist different rules for the wealth held by non-residents or the wealth held by residents in other countries. The HFCS only includes the wealth held by residents and does not specify where wealth is held. Hence, for the analysis in this paper the legislation applicable to wealth held by residents within the country of residence is applied to all wealth covered in the HFCS (the tables in the appendix also only describe these rules).

Table 4 shows which of the wealth taxes are simulated in EUROMOD. Due to data limitations capital gains taxes and taxes on financial transactions are not simulated. The inheritance & gift tax and the real estate transfer tax cannot be simulated for Finland due to missing data. As shown in Figure 2 these taxes generate little revenues so the effect on our simulations will be rather limited. Other data limitations include the fact that taxable values of real estate (sometimes also referred to as cadastral values) are approximated as a share of market values, that inheritances & gifts between spouses are not recorded and that regional information is missing (Boone et al., 2019). The latter may affect the results the most as several countries have regional elements in their wealth taxes. For Belgium the

regional differences are the most extensive so we do simulate these regional elements by assigning sample households at random to the Flemish, Walloon and Brussels Capital Region in accordance to their respective population shares. For the other countries there are often regional or municipal differences in tax rates of the real estate tax and the real estate transfer tax, in which case we used averages. For Spain we simulate the national tax legislation for the inheritance & gift tax and the net wealth tax, although the Autonomous Regions can decide on different rules.

Table 4: Wealth tax coverage in EUROMOD

	BE	FI	FR	DE	IT	ES
Capital income tax ⁵	S	S	S/N ⁶	S	S	S
Capital gains tax	N/A	N	N	N	N	N
Real estate tax ⁷	S	S	S	S	S	S
General wealth tax	N/A	N/A	S	N/A	N/A	S
Specific wealth tax	S	N/A	N/A	N/A	S	N/A
Real estate transfer tax	S	N	S	S	S	S
Inheritance and gift tax	S	N	S	S	S	S

Notes: S = Tax simulated in EUROMOD, N = Tax not simulated, N/A= Tax does not exist.

Source: Boone et al. (2019)

To be able to use the HFCS-based underlying dataset, which contains information of 2010, 2009 or 2007 (see Table 2), for the simulations of 2017 policies monetary variables need to be updated to 2017. Income variables are generally updated based on the evolution of the price index or other relevant information. The asset and debt variables are adjusted according to their aggregate evolution in the national accounts between the HFCS reference year and 2017. Non-monetary variables are assumed to have remained the same. Our simulation results were extensively validated on both their internal and external consistency (see Boone et al., 2019).⁸

3.3 Evaluating wealth taxes

Previous studies on the empirical effects of wealth taxation typically evaluate its impact against the income distribution (e.g. Halvorsen & Thoresen, 2019; Lawless & Lynch, 2016). Although this relates to the fact that taxes are usually paid with income and all existing indicators are developed in income terms, this approach implicitly assumes that it is income inequality which we mainly care about and its decrease is the main goal of wealth taxation. In the literature in general it is often unclear whether the

⁵ Capital income generally excludes rental income, which is taxed under the personal income tax. Only in Finland rental income is taxed under the capital income tax.

⁶ In France capital income is taxed under the personal income tax so there is no separate simulation.

⁷ The Belgian real estate tax is sometimes labelled as an income tax as it is levied on the concept of 'cadastral income', which reflects an approximation of the average rent that would be paid for the real estate property. Here we categorise it as a wealth tax in line with other countries.

⁸ Simulated tax revenues have been validated against external figures. This shows some relatively large discrepancies in some cases. This could be due to underreporting in the underlying data and/or the fact that external figures are not always comparable to what we simulate (e.g. only taxes paid by individuals are simulated, while external statistics often also cover taxes paid by corporations). We use the HFCS data by itself and do not combine it with other information coming for instance from national or international rich lists (e.g. Bach et al., 2019; Eckerstorfer et al., 2016; Vermeulen, 2018; 2016). The validation of the tax revenues shows that the wealth taxes most targeted at the rich, i.e. the net wealth taxes of France and Spain, are already oversimulated based on information from HFCS alone. In the real world tax avoidance and evasion significantly reduces the actual tax revenues obtained. By not including additional information on the rich we believe we more accurately simulate those who are paying the taxes in practice and therefore their redistributive effects.

main concern of redistribution should be to decrease wealth inequality or income inequality (Fleischer, 2016). Since it concerns taxes on wealth one could just as well argue that their main goal is to decrease wealth inequality, which does not necessarily coincide with income inequality. Therefore, we first start in Section 4 by evaluating wealth taxes against their (potential) tax base, i.e. the distribution of wealth. In this perspective wealth taxes are considered to reduce the after-tax stock of wealth. In contrast to these two approaches, our main argument is that we should care about both income and wealth inequality as well as how they are related to each other. Therefore, the main reference framework used in this paper is an integrated one, in which we assess the effects of taxes against the joint distribution of income and wealth. As discussed in Section 2 our main argument is that well-being and ability to pay ultimately depend on both income and wealth such that one's total tax liability should be linked to one's position in the joint distribution of income and wealth.

In order to derive a measure of the joint distribution of the flow of income and the stock of wealth we use the approach first proposed by Weisbrod & Hansen (1968) to annuitise wealth into a flow of resources, which is then added to income, based on the following formula:

$$AY = Y + \left[\frac{\rho}{1 - (1 + \rho)^{-n}} \right] * NW \quad (1)$$

$$n = T \text{ for unmarried,}$$

$$T_1 + (T - T_1)b \text{ for married}$$

AY refers to annuitised income, Y equals income received from labour, pensions and other transfers, NW is net worth (defined as the difference between gross wealth and liabilities), while ρ and n are the interest rate and length of the annuity. With regard to the latter T_1 refers to time to death of the first person, T time to death of the survivor. These are expressed in life expectancies by country, age and gender. b is the reduction in the equivalence scale which results from the death of the first person. We equalise income and wealth by the modified OECD scale.

In a previous paper (Kuypers et al., 2019) we propose to extend this approach by defining pre-tax and post-tax concepts of annuitized wealth which in turn are used to evaluate the redistributive capacity of wealth taxes. We assume that wealth taxes are not paid with income, but instead lower the amount of their tax base, i.e. wealth. One-time event wealth taxes (i.e. inheritance & gift and real estate transfer taxes) are taken into account in the wealth that is subject to the annuitization, while the yearly recurrent wealth taxes (i.e. real estate, specific and general net wealth taxes) are captured by the difference between a gross and a simulated net interest rate of the annuity (ρ). Hence, the effects of wealth taxes are taken into account from the moment of observation until the expected moment of death. This long-term perspective is important given that wealth taxes mainly have an effect in the long run (Cowell & Van de gaer, 2017; Halvorsen & Thoresen, 2019; Yunker, 2010). In practice we start from a 5% gross interest rate for everyone (long-term pre-tax interest rate assumed in Piketty (2014)⁹) and then simulate a net interest rate depending on the recurrent wealth taxes paid. For the existing tax systems this is on average equal to 4.82% in Belgium, 4.90% in Germany, 4.76% in Spain, 4.42% in Finland, 4.84% in France and 4.83% in Italy. As the event wealth taxes are subtracted from the wealth

⁹ In practice rates of return to wealth have been found to differ substantially between individuals, but due to information constraints, we have not been able to take this into account. However, the actual choice of the interest rate has only a limited impact on the results (see also Kuypers & Marx, 2018), it is the difference between the net and gross interest rate that is of main importance here.

that is annuitized the difference between gross and net annuitized net wealth is equal to multiplying the payable taxes with the net annuity, while the impact of yearly wealth taxes is equal to gross annuitized wealth times the difference between the gross and net annuity.

In the following two sections we will evaluate wealth taxes as in place in 2017 on grounds of vertical and horizontal equity. Regarding the first we measure redistributive effects (RE) of wealth taxes in the Lorenz curve framework as initiated by Musgrave & Thin (1948) and Kakwani (1977a, 1977b). The overall redistributive effects are given by the difference between the pre-tax and post-tax Gini coefficients:

$$RE = Gini_{pre-tax} - Gini_{post-tax} \quad (2)$$

We also decompose this overall redistributive effect into the contributions of each of the different types of wealth taxes which depends on their tax rate and progressivity. For this we use the decomposition approach developed by Lambert & Phähler (1988) and Duclos (1993). The overall redistributive effect shown in equation (2) is the result of a vertical equity effect (VE), traditionally captured in the Reynolds-Smolensky (1977) index (RS), and a reranking effect (RR) that captures the impact of individuals that may swap positions in the distribution before and after taxes. The Reynolds-Smolensky index can then be further decomposed to highlight the contribution of each tax T_i with t_i the individual tax rates ($i=1\dots I$). Overall progressivity is measured as the weighted sum of the i indices of tax progressivity of each tax.

$$RE = VE - RR = RS - RR \quad (3)$$

$$VE = \frac{1}{(1-t)} \sum_{i=1}^I t \Pi_i^K \quad (4)$$

While vertical equity indicators present to which extent those with unequal ability to pay are treated differently by the tax system, the concept of horizontal equity refers to the extent to which those with equal ability to pay are treated similarly. Atkinson (1980) and Plotnick (1981) consider reranking as a measure of horizontal inequity, while others look at the unequal treatment of equals that does not automatically result in reranking (e.g. Lambert & Aronson, 1993). However, the empirical implementation of horizontal equity indicators largely depends on how to define 'equals' which may be difficult in practice (Verbist & Figari, 2014). Therefore we opted for a more pragmatic approach by each time running the simulations on the same total sample and simply changing the resource from which they derive their living standard. In other words, we analyse how the same set of people would be treated differently by the tax system in some hypothetical cases (see Section 5 for more details).

Finally, it is important to note that EUROMOD is a static simulation model which takes the pre-tax distribution as given. This implies that we only study the direct effects of wealth taxation, while they can of course also have an indirect impact, for instance through behavioural effects, which has been recently demonstrated by a number of studies (e.g. Jakobsen et al., 2020; Seim, 2017; Durán-Cabré et al., 2019; Brülhart et al., 2016; Zoutman, 2015).

4 Assessment of wealth taxes: vertical equity

In this section we evaluate the impact of existing wealth taxes in terms of vertical equity. We first start with an evaluation perspective against the distribution of wealth alone, afterwards we will also include income. There are two potential wealth concepts to rank units, i.e. either gross or net wealth, where the latter takes into account outstanding debt on gross wealth.¹⁰ There are arguments in favour of using either one of the two as tax base, and hence also as the reference framework against which to assess equity. On the one hand, if debts can be deducted from the tax base this may provide an incentive to increase borrowing, which in turn facilitates tax avoidance and may raise financial stability concerns (McDonnell, 2013; OECD, 2018b). On the other hand, net wealth is argued to better reflect ability to pay and may therefore be more relevant in terms of vertical and horizontal equity considerations. While net wealth is the main tax base for inheritance & gift taxes and the net wealth taxes of France and Spain, other wealth related taxes generally use gross wealth as tax base. Comparing the two approaches also sheds light on the relation between the distribution of wealth taxes and debt.

Table A.7 in the appendix presents the pre-tax and post-tax Gini coefficients and their difference (i.e. redistributive effect) for both gross wealth and net wealth. It evaluates the redistributive effects of wealth taxes (1) against the stock of wealth as originally observed in the HFCS data, (2) in the annuity framework and (3) in the joint income-wealth framework. In terms of interpretation the stock approach can be regarded as focusing on the actual tax payment that takes place in a given year, while in the annuity framework the redistributive effect reflects the difference in amount which is available for spending in a given year. The comparison of the bottom¹¹ and middle part of Table A.7 shows the effect of the reranking of individuals between the income and wealth distributions, which are imperfectly correlated (Kuypers et al., 2019, 2020 forthcoming). As redistributive effects are in all cases very small, we do not discuss them in detail, but we move to the two building bricks of the redistributive effect of taxes, notably their progressivity (Kakwani) and size (average tax rate). These are shown in Table 5 and Figure 3 respectively. As it is considered to best reflect ability to pay we use net wealth as the main reference framework. In terms of progressivity Table 5 presents Kakwani indices across the three assessment frameworks. In line with the results for redistributive effects we find that overall progressivity (last column) is substantially higher when assessed against the joint income-wealth framework compared to when only (annuitized) wealth is used. This implies that the incidence of wealth taxation is more concentrated in the top of the joint income-wealth distribution than in the top of the wealth distribution by itself. Progressivity is strongest in Finland, France and Italy, while relatively low in Belgium. As a matter of sensitivity check Kakwani indices are also calculated for gross wealth, which are presented in Table A.6 in the Appendix. Similarly as for the redistributive effects we find that there is often higher progressivity (or less regressivity) when wealth taxes are assessed against gross wealth.

¹⁰ To avoid confusion we use gross and net here to refer to the difference with or without taking into account outstanding debt, while we use the terms pre-tax and post-tax to distinguish whether or not taxes are taken into account.

¹¹ It is important to note that in the joint income-wealth framework all Gini coefficients are after income tax and hence the redistributive effect should be interpreted as the extent to which wealth taxation redistributes on top of the redistribution achieved by income taxes. Another possibility would be to calculate all Gini coefficients before income tax which would show how wealth taxation by itself redistributes market inequalities. Yet, as the literature typically considers wealth taxes as a surtax on income taxes (e.g. McDonnell, 2013, p.41), the first option was chosen.

Table 5: Kakwani indices (net wealth)

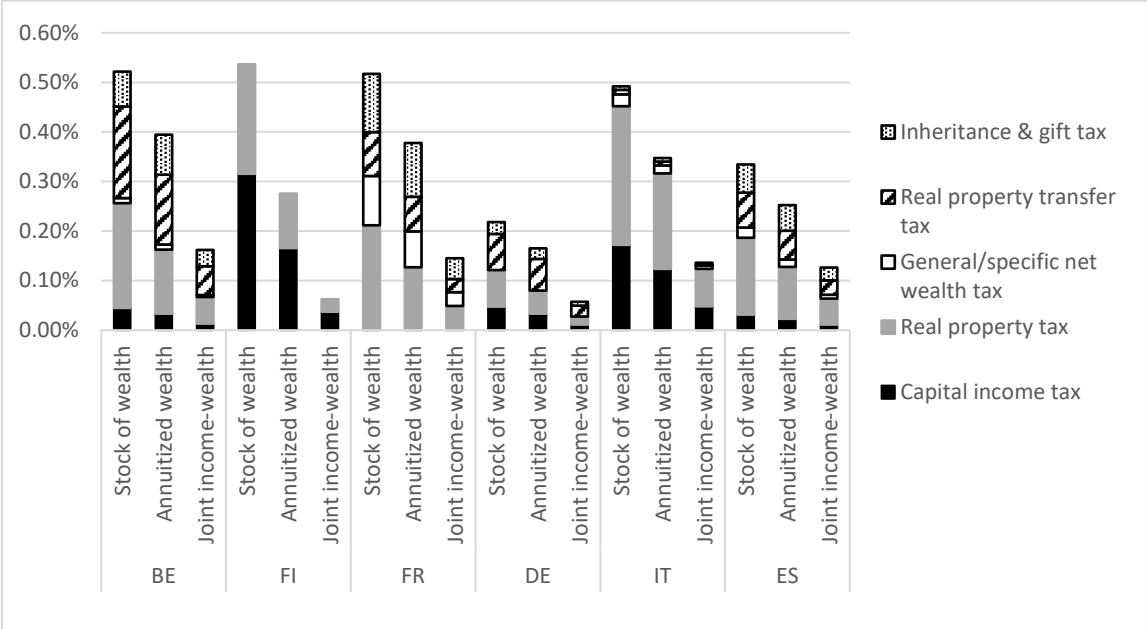
		Capital income tax	Real property tax	General/specific net wealth tax	Real property transfer tax	Inheritance & gift tax	Total
BE	Stock of wealth	0.113* (0.019)	-0.120* (0.008)	0.186* (0.038)	-0.724* (0.065)	-0.021 (0.062)	-0.295* (0.041)
	Annuitized wealth	0.135* (0.018)	-0.043* (0.006)	0.149* (0.034)	-0.786* (0.066)	0.029 (0.092)	-0.274* (0.055)
	Joint income-wealth	0.400* (0.024)	0.198* (0.009)	0.390* (0.040)	-0.249* (0.045)	0.308* (0.094)	0.083* (0.041)
FI	Stock of wealth	0.041* (0.014)	-0.303* (0.006)				-0.101* (0.011)
	Annuitized wealth	0.257* (0.042)	-0.096* (0.004)				0.115* (0.023)
	Joint income-wealth	0.600* (0.041)	0.201* (0.004)				0.440* (0.023)
FR	Stock of wealth		-0.106* (0.006)	0.316* (0.006)	-0.381* (0.035)	0.096* (0.027)	-0.026* (0.012)
	Annuitized wealth		-0.037* (0.005)	0.292* (0.005)	-0.421* (0.034)	0.057 (0.046)	-0.018 (0.018)
	Joint income-wealth		0.261* (0.005)	0.627* (0.005)	0.029 (0.035)	0.340* (0.060)	0.311* (0.020)
DE	Stock of wealth	0.052 (0.034)	-0.033* (0.006)		-0.269* (0.053)	-0.011 (0.081)	-0.092* (0.022)
	Annuitized wealth	0.060 (0.031)	0.016* (0.003)		-0.268* (0.058)	-0.037 (0.080)	-0.092* (0.024)
	Joint income-wealth	0.354* (0.047)	0.288* (0.008)		0.061 (0.064)	0.314* (0.059)	0.217* (0.028)
IT	Stock of wealth	0.076* (0.008)	0.167* (0.005)	-0.279* (0.011)	-0.114* (0.039)	-0.040 (0.095)	0.105* (0.005)
	Annuitized wealth	0.072* (0.008)	0.149* (0.005)	-0.183* (0.013)	-0.174* (0.041)	0.008 (0.084)	0.096* (0.005)
	Joint income-wealth	0.315* (0.007)	0.333* (0.007)	0.031* (0.012)	0.054 (0.042)	0.181 (0.098)	0.303* (0.006)
ES	Stock of wealth	0.209* (0.026)	-0.079* (0.004)	0.425* (0.007)	-0.103* (0.041)	0.160* (0.040)	0.015 (0.015)
	Annuitized wealth	0.203* (0.021)	-0.058* (0.004)	0.391* (0.006)	-0.191* (0.040)	0.107* (0.038)	-0.005 (0.015)
	Joint income-wealth	0.366* (0.024)	0.071* (0.005)	0.568* (0.005)	0.046 (0.048)	0.226* (0.059)	0.153* (0.019)

Note: Standard errors are shown between parentheses, * denotes that kakwani index is significantly different from zero (at 5% confidence level), i.e. significantly different from proportionality
Source: Own calculations based on HFCS-EUROMOD simulations

More importantly, however, Table 5 also presents the Kakwani indices for each of the different types of wealth taxes separately. When assessed against the distribution of (annuitized) wealth the general net wealth taxes of France and Spain are the most progressive ones which is expected given that the threshold for liability is equal to €1,300,000 and €700,000 respectively. In Finland and Belgium the capital income tax is the most progressive type of wealth tax. In Italy both the capital income tax and the real estate tax are progressive. In Germany, however, wealth taxes are either regressive or proportional (i.e. Kakwani index not significantly different from zero) when evaluated against (annuitized) net wealth. Interestingly, the incidence of the real estate tax and the real estate transfer tax is regressive in all countries except for the Italian recurrent real estate tax.

When the assessment framework is broadened to also include income then progressivity generally increases (or regressivity decreases). Yet, the ranking of the most progressive type of wealth tax remains the same; the general net wealth tax in France and Spain is by far the most progressive type. Also the capital income tax in Belgium, Finland and Italy exhibit a high degree of progressivity. In Germany the inheritance & gift tax becomes significantly and highly progressive when the joint income-annuitized wealth framework is used. Also for the other countries for which the inheritance & gift tax is simulated it is much more progressive when both income and wealth are taken into account in the reference framework. Also real estate taxes are significantly progressive in all countries when applying this framework. The real estate transfer tax on the contrary is regressive or proportional in all countries. Again, progressivity is slightly higher when gross instead of net wealth is used (with some exceptions in the case of joint income-annuitized wealth) (see Table A.6. in the appendix).

Figure 3: Size of wealth taxes: average tax rate (net wealth)



Source: Own calculations based on HFCS-EUROMOD simulations

Yet, despite the sometimes strong progressive incidence of wealth taxation, the redistribution they achieve is so small due to the fact that their size is negligible in the total redistributive system. Indeed, as Figure 3 shows tax rates are extremely small, with the sum of all wealth taxes always less than 1% of the potential tax base. The average tax rate decreases between the stock and annuitized wealth framework due to the different way in which the effect of wealth taxes is taken into account; i.e. event

wealth taxes lower the amount subject to annuitization, while recurrent wealth taxes impact through the interest rate applied in the annuity itself. Average tax rates decrease of course even stronger when income is added as the denominator then becomes larger. When gross wealth would be used instead of net wealth all the results would decrease even further.

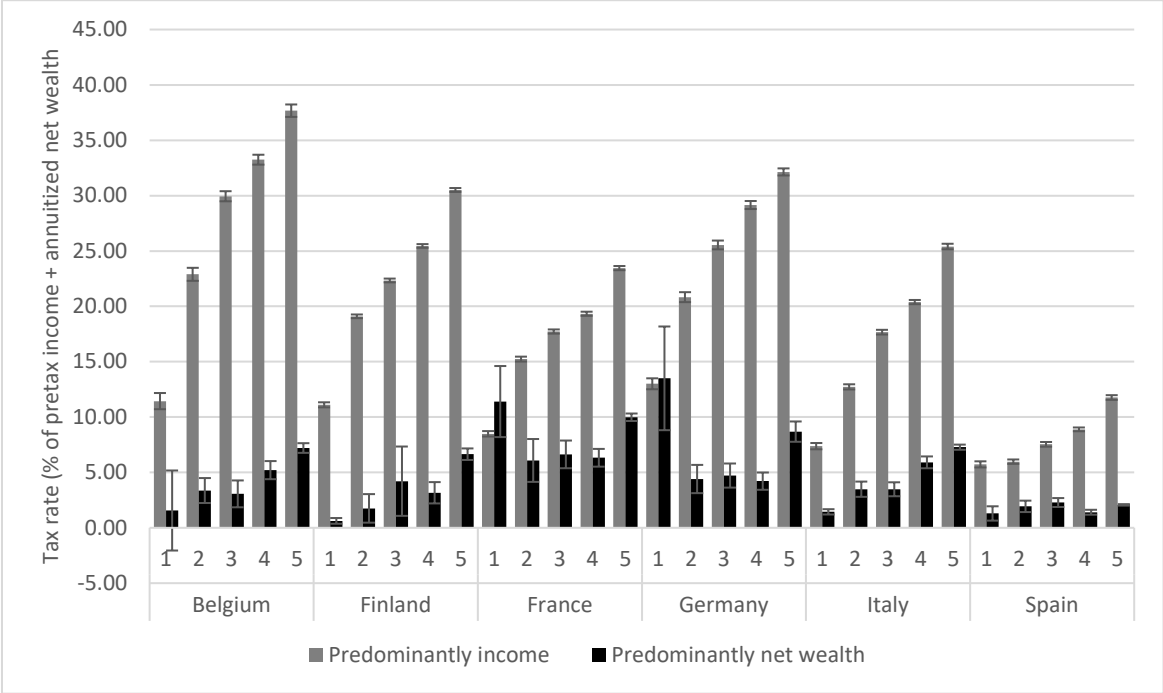
5 Integrated assessment of income and wealth taxes: horizontal equity

In this section we turn to an empirical illustration of our main argument in favour of (higher) wealth taxation, i.e. increasing the horizontal equity between income and wealth taxation. As mentioned before, we argue that well-being and ability to pay essentially depend on all available financial resources. Two persons or households with the same position in the joint income-wealth distribution are considered to have a similar level of well-being and ability to pay and hence should for tax purposes be treated equally irrespective of whether they derive this level primarily from their income or wealth. In this section we show how far away the current tax system is from achieving such horizontal equity.

Figure 4 first shows the total tax rate (i.e. sum of income taxes, social insurance contributions and annuitized wealth taxes as a percentage of pre-tax income + annuitized net wealth) by quintiles for two groups: those who predominantly derive their living standard from income and those who predominantly derive it from annuitized wealth. We use 65% of total living standard coming from either income or annuitized wealth as threshold (so those who have a more balanced mix are not included). The results clearly show an immense difference in tax rates throughout the entire distribution. Moreover, while the tax rate paid among those predominantly retrieving their living standard from income is clearly progressive, it is more or less flat among those having mainly annuitized net wealth. It should be noted, however, that confidence intervals are often large for those having predominantly net wealth in the first quintile, due to too few observations at the bottom of the joint distribution who derive their living standard from net wealth. This implies, as expected, that wealth is most important at the top of the distribution.

Although Figure 4 already provides a good indication of the extent of horizontal inequity between the taxation of income and wealth, the operationalisation suffers from several flaws. First, as mentioned before, the assessment of horizontal equity hinges strongly on the way one defines equals. Here, we compare individuals who are only similar with respect to their pre-tax sum of income and annuitized net wealth. The differences in tax treatment may in principle be related to differences in other characteristics of tax payers. Furthermore, it only takes into account that part of the population that derives 65% or more from either resource, which sometimes results in few observations. Finally, it is difficult to determine whether certain types of wealth taxes may perform better than others.

Figure 4: Total tax rate by quintile and main source of living standard



Source: Own calculations based on HFCS-EUROMOD simulations

In order to circumvent these issues we use a more pragmatic approach in Table 6. The baseline (i.e. current) distribution of tax burdens of all individuals is compared with the tax burden in several hypothetical cases when we assume that the same set of people retrieve their living standard solely from one type of financial resource: only labour or pension income (depending on whether they are younger or older than 65), only capital income, only owner-occupied real estate, only other real estate and only financial assets. What we do in practice is take each time the full sample and change the 'label' of their total standard of living, i.e. in a first case we set the value of labour/pension income equal to the total amount of the pre-tax sum of income and annuitized net wealth, while all other resources are set to zero, in a second case capital income is set equal to this amount, etc. In other words, living standards are always the same as in the baseline, but it is each time assumed that it only comes from one source. Before calculating the tax liabilities the annuities are calculated back to stock variables and when it concerns real estate cadastral amounts are derived. These relabelled datasets are then each time ran through EUROMOD to simulate the hypothetical tax liabilities. The fact that we only look at one financial source means that we abstract for instance from the fact that when financial assets and non-owner-occupied real estate is held, this will in reality always generate an income flow which is then also subject to the capital income tax. We only take into account recurrent wealth taxes. We always simulate the hypothetical tax using the general rules, i.e. without taking into account specific deductions, credits or preferential tax rates. For instance, in the case of capital income taxation in Belgium there is a lower tax rate applied to interests from savings accounts, but we simulate the general tax rule (see Table A.1 in the appendix). Also, in the general net wealth taxes of France and Spain as well as the real estate tax in France a cap on tax liability in function of income is built in (see Table A.2 and A.3 in the appendix). This is not taken into account in the simulation of the hypothetical tax burdens as the assumption is that there is no income in these cases.

Table 6 presents the average tax rates that result from this approach both across quintiles (1-5) and the general average. In the case when we assume living standards to be only derived from labour or pension income (third column) or only from capital income (fourth column) average tax burdens are generally higher than in the actual situation. Yet, while there is clearly a progressive structure in the first case, there is a more or less flat tax rate in the capital income case. When we consider wealth to be the only source of living standards (last three columns), however, average tax rates drop tremendously. In none of the countries the average tax rates surpasses 1%, not even in the top quintile. Even among the wealth cases themselves there is clearly horizontal inequity. Indeed, while most countries tax the ownership of real estate wealth, financial wealth is only taxed in Italy (specific net wealth tax), France and Spain (general net wealth tax). However, it is still taxed at very low rates, only at the top in the latter two countries and all three do not tax self-employment business wealth. There are some differences in the tax treatment between owner-occupied and other real estate wealth, but they are generally quite small. The difference is the largest for Italy as the main residence is exempted in the real estate tax, while other real estate appears to be more heavily taxed than in other countries. In short, horizontal inequity is even much worse than first expected based on Figure 4. This implies that the taxes that are paid by those with predominantly net wealth in Figure 4 mainly records the tax they still pay on the small part of their living standard that is derived from income.

Hence, a more similar treatment of different types of financial resources has the potential to largely improve the current tax system, not only through their direct effect on vertical and horizontal equity, but also more indirectly because it would reduce the incentives for tax avoidance through portfolio (re)organisation which is typically easier for wealthier households (OECD, 2018a, 2018b). Taxing all resources at the rate of the capital income tax or personal income tax would achieve much more horizontal equity and increase the tax rates to a sufficiently high level to be able to achieve a substantial level of redistribution. However, improvement in terms of vertical equity can currently only be achieved through taxing everything under the personal income tax as capital income is generally levied at a more or less proportional rate. If we would indeed broaden the tax base by taxing both income and annuitized net wealth under the personal income tax, then our estimations indicate that total tax revenues have the potential to increase compared to tax revenues obtained in the existing tax system by 36% in Finland, 40% in Germany, 51% in France, 60% in Italy and even by 74% in Belgium and 92% in Spain. This increase in tax revenues due to more horizontal equity, would then also possibly allow for a decrease of the applicable tax rates, especially at the bottom of the distribution, which would then in turn be an additional improvement on vertical equity grounds. Such a broad base-low rate tax system would then not only improve fairness, but also decrease the incentives for tax avoidance, while the low rate should make financial investments still worthwhile. Of course it should be noted that the hypothetical cases studied here have little relation to what is possible in reality. Yet, this approach nicely shows the strong lack of horizontal equity in the existing tax system as well as the level of potential improvements with a more neutral tax treatment of different resources.

Table 6: Average tax rates (% of pre-tax income + annuitized wealth) real and hypothetical cases

	Baseline (current system)		Only labour/pension income		Only capital income		Only owner- occupied real estate		Only other real estate		Only financial assets	
	<i>se</i>	<i>se</i>	<i>se</i>	<i>se</i>	<i>se</i>	<i>se</i>	<i>se</i>	<i>se</i>	<i>se</i>	<i>se</i>	<i>se</i>	<i>se</i>
Belgium												
1	10.81	<i>0.34</i>	25.78	<i>0.34</i>	30.00	<i>0.00</i>	0.08	<i>0.00</i>	0.07	<i>0.00</i>	0.00	<i>0.00</i>
2	20.93	<i>0.30</i>	36.88	<i>0.18</i>	30.00	<i>0.00</i>	0.09	<i>0.00</i>	0.08	<i>0.00</i>	0.00	<i>0.00</i>
3	25.78	<i>0.31</i>	42.72	<i>0.12</i>	30.00	<i>0.00</i>	0.11	<i>0.00</i>	0.09	<i>0.00</i>	0.00	<i>0.00</i>
4	28.56	<i>0.31</i>	45.85	<i>0.09</i>	30.00	<i>0.00</i>	0.11	<i>0.00</i>	0.09	<i>0.00</i>	0.00	<i>0.00</i>
5	26.65	<i>0.38</i>	50.22	<i>0.08</i>	30.00	<i>0.00</i>	0.13	<i>0.00</i>	0.10	<i>0.00</i>	0.00	<i>0.00</i>
Total	22.54	<i>0.17</i>	40.28	<i>0.14</i>	30.00	<i>0.00</i>	0.10	<i>0.00</i>	0.10	<i>0.00</i>	0.00	<i>0.00</i>
Finland												
1	10.97	<i>0.11</i>	18.27	<i>0.09</i>	30.08	<i>0.02</i>	0.05	<i>0.00</i>	0.09	<i>0.00</i>	0.00	<i>0.00</i>
2	18.31	<i>0.09</i>	25.00	<i>0.07</i>	30.41	<i>0.01</i>	0.06	<i>0.00</i>	0.12	<i>0.00</i>	0.00	<i>0.00</i>
3	21.18	<i>0.09</i>	28.47	<i>0.06</i>	30.80	<i>0.01</i>	0.07	<i>0.00</i>	0.13	<i>0.00</i>	0.00	<i>0.00</i>
4	23.63	<i>0.10</i>	32.15	<i>0.05</i>	31.36	<i>0.01</i>	0.07	<i>0.00</i>	0.14	<i>0.00</i>	0.00	<i>0.00</i>
5	27.21	<i>0.11</i>	38.34	<i>0.06</i>	32.20	<i>0.01</i>	0.08	<i>0.00</i>	0.17	<i>0.00</i>	0.00	<i>0.00</i>
Total	20.26	<i>0.06</i>	28.44	<i>0.05</i>	30.97	<i>0.01</i>	0.07	<i>0.00</i>	0.13	<i>0.00</i>	0.00	<i>0.00</i>
France												
1	8.55	<i>0.12</i>	20.23	<i>0.09</i>	16.02	<i>0.03</i>	0.09	<i>0.00</i>	0.10	<i>0.00</i>	0.00	<i>0.00</i>
2	14.45	<i>0.11</i>	20.79	<i>0.07</i>	18.84	<i>0.05</i>	0.10	<i>0.00</i>	0.11	<i>0.00</i>	0.00	<i>0.00</i>
3	16.00	<i>0.10</i>	22.28	<i>0.06</i>	22.22	<i>0.04</i>	0.12	<i>0.00</i>	0.13	<i>0.00</i>	0.00	<i>0.00</i>
4	16.18	<i>0.10</i>	24.12	<i>0.06</i>	26.15	<i>0.04</i>	0.13	<i>0.00</i>	0.14	<i>0.00</i>	0.00	<i>0.00</i>
5	17.53	<i>0.09</i>	29.92	<i>0.05</i>	33.40	<i>0.03</i>	0.15	<i>0.00</i>	0.20	<i>0.00</i>	0.05	<i>0.00</i>
Total	14.54	<i>0.05</i>	23.47	<i>0.04</i>	23.33	<i>0.04</i>	0.12	<i>0.00</i>	0.14	<i>0.00</i>	0.01	<i>0.00</i>
Germany												
1	12.94	<i>0.24</i>	21.30	<i>0.31</i>	24.79	<i>0.04</i>	0.03	<i>0.00</i>	0.03	<i>0.00</i>	0.00	<i>0.00</i>
2	19.95	<i>0.23</i>	27.29	<i>0.28</i>	25.47	<i>0.01</i>	0.03	<i>0.00</i>	0.03	<i>0.00</i>	0.00	<i>0.00</i>
3	22.77	<i>0.23</i>	30.01	<i>0.24</i>	25.73	<i>0.00</i>	0.04	<i>0.00</i>	0.04	<i>0.00</i>	0.00	<i>0.00</i>
4	25.28	<i>0.22</i>	33.58	<i>0.21</i>	25.90	<i>0.01</i>	0.04	<i>0.00</i>	0.04	<i>0.00</i>	0.00	<i>0.00</i>
5	24.87	<i>0.20</i>	37.63	<i>0.14</i>	26.08	<i>0.01</i>	0.05	<i>0.00</i>	0.05	<i>0.00</i>	0.00	<i>0.00</i>
Total	21.15	<i>0.11</i>	29.95	<i>0.11</i>	25.59	<i>0.01</i>	0.04	<i>0.00</i>	0.04	<i>0.00</i>	0.00	<i>0.00</i>
Italy												
1	6.32	<i>0.12</i>	10.70	<i>0.20</i>	25.53	<i>0.06</i>	0.00	<i>0.00</i>	0.31	<i>0.01</i>	0.13	<i>0.01</i>
2	11.40	<i>0.11</i>	15.84	<i>0.12</i>	26.00	<i>0.00</i>	0.00	<i>0.00</i>	0.42	<i>0.01</i>	0.07	<i>0.00</i>
3	15.54	<i>0.10</i>	24.24	<i>0.08</i>	26.00	<i>0.00</i>	0.00	<i>0.00</i>	0.47	<i>0.00</i>	0.07	<i>0.00</i>
4	17.64	<i>0.10</i>	30.22	<i>0.06</i>	26.00	<i>0.00</i>	0.00	<i>0.00</i>	0.53	<i>0.00</i>	0.07	<i>0.00</i>
5	19.23	<i>0.13</i>	36.39	<i>0.06</i>	26.00	<i>0.00</i>	0.00	<i>0.00</i>	0.57	<i>0.00</i>	0.07	<i>0.00</i>
Total	14.02	<i>0.06</i>	23.48	<i>0.09</i>	25.91	<i>0.01</i>	0.00	<i>0.00</i>	0.46	<i>0.00</i>	0.08	<i>0.00</i>
Spain												
1	5.07	<i>0.11</i>	6.72	<i>0.06</i>	19.75	<i>0.01</i>	0.08	<i>0.00</i>	0.08	<i>0.00</i>	0.00	<i>0.00</i>
2	5.17	<i>0.08</i>	9.22	<i>0.07</i>	20.33	<i>0.00</i>	0.10	<i>0.00</i>	0.10	<i>0.00</i>	0.00	<i>0.00</i>
3	5.30	<i>0.07</i>	11.69	<i>0.06</i>	20.53	<i>0.00</i>	0.10	<i>0.00</i>	0.10	<i>0.00</i>	0.00	<i>0.00</i>
4	6.36	<i>0.08</i>	13.78	<i>0.06</i>	20.73	<i>0.01</i>	0.10	<i>0.00</i>	0.10	<i>0.00</i>	0.00	<i>0.00</i>
5	6.50	<i>0.05</i>	16.70	<i>0.03</i>	21.34	<i>0.01</i>	0.14	<i>0.00</i>	0.16	<i>0.00</i>	0.05	<i>0.00</i>
Total	5.68	<i>0.03</i>	11.62	<i>0.04</i>	20.54	<i>0.01</i>	0.10	<i>0.00</i>	0.11	<i>0.00</i>	0.01	<i>0.00</i>

Notes: 1 to 5 denotes quintiles of pre-tax income + annuitized net wealth, standard errors (se) are shown in italics

Source: Own calculations based on HFCS-EUROMOD simulations

6 Conclusion

Traditionally wealth taxation was considered to be non-optimal if it is possible to use non-linear labour income tax. Recently, however, arguments in favour of wealth taxation have increased substantially, based on redistributive as well as efficiency and revenue considerations. The main argument put forward in this paper is that well-being and ability to pay essentially depend on both income and wealth and that this should be reflected in the tax system. Nevertheless, in practice there seems to be a general trend towards less rather than more wealth taxation. As a consequence of globalisation and increased mobility of capital, legitimate fears of discouraging investment and entrepreneurship and capital flight have emerged. In combination with the overall costs of tax collection and prevention of tax evasion vis-à-vis the only limited tax revenues these issues have resulted in international tax competition and a race-to-the-bottom. These contradictions between recommendations and real practice make wealth taxation an interesting topic. Yet, although the theoretical literature on (optimal) wealth taxation is relatively large and growing, empirical research is still relatively scarce. This paper aims to fill this gap by analysing vertical and horizontal equity of existing wealth-related taxes in six European countries.

In a first step we analysed wealth taxes from a vertical equity perspective evaluated against six different frameworks: the distribution of the stock of wealth, of annuitized wealth and the joint distribution of annuitized wealth and income, in each case for both gross and net wealth. We show that wealth taxes hardly achieve any redistribution which is mainly due to the extremely small tax rates. Indeed, while the general net wealth taxes of France and Spain, the capital income taxes in Belgium, Finland and Italy and the Italian real estate tax have a strongly progressive incidence, their size is just too small compared to the potential tax base to achieve any redistribution. When the assessment framework is broadened to also include income then progressivity generally increases (or regressivity decreases), which results in slightly stronger redistributive effects. Nevertheless, redistribution through wealth taxation is still extremely small compared to the redistribution that is achieved by more 'traditional' instruments such as personal income taxes, social insurance contributions and social transfers (see also Kuypers et al., 2019, 2020 forthcoming).

In a second step we then analysed wealth taxes side by side income taxes which shows that in the prevalent tax system there is a lack of neutrality with regard to the source from which households draw their financial living standard. Those who derive their living standard predominantly from (labour) income bear much higher taxes than those who derive it mainly from (annuitized) wealth. Moreover, while tax rates are clearly progressive among the first group, they are more or less flat among the latter. Our approach of hypothetical cases in which all people are assumed to derive their living standard solely from one potential financial resource confirms these results and also shows that there is even a lack of horizontal equity between different types of assets. While most countries tax the ownership of real estate wealth, financial wealth is only taxed in Italy, France and Spain. However, it is still taxed at very low rates, only at the top in the latter two countries and all three do not tax self-employment business wealth. There are some differences in the tax treatment between owner-occupied and other real estate wealth, but they are generally quite small.

Based on these results we argue that from an equity perspective the total tax system (i.e. combination of income and wealth taxes) should be designed in such a way that it decreases overall joint income-

wealth inequality, not only income inequality. This implies both increasing the vertical redistribution achieved by wealth taxes and moving closer to horizontal equity between the tax treatment of different financial resources. Our hypothetical scenario of taxing all financial resources similarly in the personal income tax would achieve both these goals, would substantially increase tax revenues and would reduce the incentives for tax avoidance. Yet, this hypothetical scenario obviously stands too far from the current situation to be politically feasible anytime soon. Hence, we leave it open for future research and political debates to determine how more vertical and horizontal equity in the tax system may be achieved in practice.

We have focused in our empirical analysis on equity, but future research of alternative policy scenarios should also incorporate the efficiency side of the story. The major arguments against introducing more wealth-related taxes stem from efficiency arguments, and especially issues like tax avoidance and tax evasion (e.g. in the form of capital flight) are often put forward in the debate. Further research is needed to try to estimate the size of such behavioural responses, in order to gauge a better understanding of how this may affect distributive outcomes and of the feasibility of more wealth taxation.

A limitation of this paper is that due to data constraints some types of wealth-related taxes are not included. First, we cannot simulate capital gains taxes which are considered to be an important aspect of the taxation of wealth. The OECD (2018b), for instance, argues that if there is a combination of a broad based and progressive system of capital income, capital gains and inheritance tax then a general net wealth tax is not necessarily needed. Furthermore, we only take into account taxes levied on individuals or households, but countries generally also levy a corporate income tax, and some countries even a corporate net wealth tax, which are considered to be indirectly paid by individual shareholders. Moreover, there may be a significant interaction between the two: if wealth taxes levied on individuals increase then more people might choose to incorporate and hence transfer income from the individual to the corporate level. Hence, future studies may want to try to include these types of wealth-related taxes. Given our main results we expect similar effects for capital gains and corporate taxes. Indeed, the analysis clearly shows that despite substantial progressivity the low redistribution of wealth taxes is mainly due to their small size. Capital gains and shares are generally concentrated at the top of the distribution such that their taxation may be strongly progressive, yet their size will also be small compared to total wealth. Finally, we only focused on the actual taxation of wealth, while tax reliefs granted for wealth accumulation in the personal income tax (i.e. for private pension saving, mortgage interests, ...) also reflect an important aspect of the tax system as it lowers the tax burden of wealth owners vis-à-vis non-wealth owners (Kuypers, 2018).

7 References

- Alstadsæter, A., Johannesen, N., & Zucman, G. (2018). Who owns the wealth in tax havens? Macro evidence and implications for global inequality. *Journal of Public Economics*, 162, 89-100.
- Alvaredo, F., Chancel, L., Piketty, T., Saez, E., & Zucman, G. (2018). *World inequality report 2018*. WID.world.
- Arrondel, L., Roger, M., & Savignac, F. (2014). *Wealth and income in the Euro area. Heterogeneity in households' behaviours?* ECB Working Paper No.1709.
- Atkinson, A. (1980). Horizontal inequity and the distribution of the tax burden. In H. Aaron, & M. Boskin, *The Economics of Taxation*. Washington D.C.: The Brookings Institution.
- Atkinson, A. B. (2015). *Inequality. What can be done?* Cambridge, Massachusetts: Harvard University Press.
- Atkinson, A., & Stiglitz, J. (1976). The design of tax structure: direct versus indirect taxation. *Journal of Public Economics*, 6(1-2), 55-75.
- Bach, S., Beznoska, M., & Steiner, V. (2014). A wealth tax on the rich to bring down public debt? Revenue and distribution effects of a capital levy in Germany. *Fiscal Studies*, 35(1), 67-89.
- Bach, S., Thiemann, A., & Zucco, A. (2019). Looking for the missing rich: Tracing the top tail of the wealth distribution. *International Tax and Public Finance*, 26(6), 1234-1258.
- Bagchi, S., & Svejnar, J. (2015). Does wealth inequality matter for growth? The effect of billionaire wealth, income distribution and poverty. *Journal of Comparative Economics*, 43(3), 505-530.
- Barberet, J., & Larquey, C. (2017). *Taux d'imposition 2017 des grandes collectivités locales*. Observatoire SFL-FORUM.
- Bastani, S., & Waldenström, D. (2020). How should capital be taxed? *Journal of Economic Surveys*.
- Boadway, R., Chamberlain, E., & Emmerson, C. (2010). Taxation of wealth and wealth transfers. In J. Mirrlees, S. Adam, T. Besley, R. Blundell, S. Bond, R. Chote, . . . J. Poterba, *Dimensions of tax design: the Mirrlees Review* (pp. 737-814). Oxford: Oxford University Press.
- Bover, O. (2008). Oversampling of the wealthy in the Spanish Survey of Household Finances (EFF). *Irving Fisher Committee Bulletin*, 28, pp. 399-402.
- Brühlhart, M., Gruber, J., Krapf, M., & Schmidheiny, K. (2016). *Taxing wealth: evidence from Switzerland*. NBER Working Paper No. 22376.
- Chamley, C. (1986). Optimal taxation of capital income in general equilibrium with infinite lives. *Econometrica*, 54(3), 607-622.
- Cowell, F., & Van de gaer, D. (2017). *Condorcet was wrong, Pareto was right: Families, inheritance and inequality*. Mimeo.

- Cowell, F., & Van Kerm, P. (2015). Wealth inequality: A survey. *Journal of Economic Surveys*, 29(4), 671-710.
- Cowell, F., Nolan, B., Olivera, J., & Van Kerm, P. (2017). Wealth, top incomes and inequality. In K. Hamilton, & C. Hepburn, *National wealth: What is missing, why it matters* (pp. 175-206). Oxford: Oxford University Press.
- Cremer, H., & Pestieau, P. (2011). Wealth and wealth transfer taxation: A survey. In E. Albi, & J. Martinez-Vazquez, *The Elgar guide to tax systems* (pp. 183-217). Cheltenham: Edward Elgar Publishing.
- Davies, J. B., Sandström, S., Shorrocks, A., & Wolff, E. N. (2011). The level and distribution of global household wealth. *The Economic Journal*, 121(551), 223-254.
- Duclos, J.-Y. (1993). Progressivity, redistribution and equity, with application to British tax and benefit system. *Public Finance/Finances Publiques*, 48(3), 350-365.
- Durán-Cabré, J. M., Esteller-Moré, A., & Mas-Montserrat, M. (2019). *Behavioural responses to the (re)introduction of wealth taxes. Evidence from Spain*. Institut d'Economia de Barcelona Working Paper 2019/04.
- Eckerstorfer, P., Halak, J., Kapeller, J., Schütz, B., Springholz, F., & Wildauer, R. (2016). Correcting for the missing rich: An application to wealth survey data. *The Review of Income and Wealth*, 62(4), 605-627.
- Ernst & Young. (2014). *Cross-country review of taxes on wealth and transfers of wealth*. European Commission.
- Eurosystem Household Finance and Consumption Network. (2013a). *The Eurosystem Household Finance and Consumption Survey - Methodological report for the first wave*. ECB Statistics Paper No1, 112p.
- Federal Public Service Finance. (2017). *Tax Survey no.29*.
- Federal Statistical Office Germany. (2017). *Durchschnittshebesätze der Realsteuern: Bundesländer, Jahre, Realsteuerart*.
- Figari, F., Paulus, A., Sutherland, H., Tsakloglou, P., Verbist, G., & Zantomio, F. (2017). Removing homeownership bias in taxation: the distributional effects of including net imputed rent in taxable income. *Fiscal Studies*, 38(4), 525-557.
- Fleischer, M. P. (2016). *Not so fast: The hidden difficulties of taxing wealth*. University of San Diego Legal Studies Paper No.16-213.
- Förster, M., Llana-Nozal, A., & Nafilyan, V. (2014). Trends in top incomes and their taxation in OECD countries. *OECD Social, Employment and Migration Working Paper No. 159*. Paris: OECD Publishing.
- Fuest, C., Neumeier, F., & Stimmelmayer, M. S. (2018). *The economic effects of a wealth tax in Germany*. ifo DICE Report No.16(2), pp.22-26.

- Godar, S., Paetz, C., & Truger, A. (2015). The scope for progressive tax reform in the OECD countries. A macroeconomic perspective with a case study for Germany. *Revue de l'OFCE*, 141(5), 79-117.
- Güvener, F., Kambourov, G., Kuruscu, B., Ocampo-Diaz, S., & Chen, D. (2019). *Use it or lose it: Efficiency gains from wealth taxation*. NBER Working Paper No.26284.
- Halvorsen, E., & Thoresen, T. O. (2019). Distributional effects of the wealth tax under a lifetime-dynastic income concept. *Scandinavian Journal of Economics*.
- Iara, A. (2015). *Wealth distribution and taxation in EU members*. European Commission Taxation Working Paper No. 60.
- IMF. (2013). *Fiscal Monitor. Taxing times*. Washington D.C.
- Immervoll, H., & Richardson, L. (2011). Redistribution policy and inequality reduction in OECD countries: What has changed in two decades? *OECD Social, Employment and Migration Working Papers No.122*. Paris: OECD.
- Jakobsen, K., Jakobsen, K., Kleven, H., & Zucman, G. (2020). Wealth taxation and wealth accumulation: Theory and evidence from Denmark. *The Quarterly Journal of Economics*, 135(1), 329-388.
- Judd, K. (1985). Redistributive taxation in a simple perfect foresight model. *Journal of Public Economics*, 28(1), 59-83.
- Kakwani, N. (1977a). Measurement of tax progressivity: an international comparison. *Economic Journal*, 87, 71-80.
- Kakwani, N. (1977b). Application of Lorenz curves in economic analysis. *Econometrica*, 45(3), 719-727.
- Kaplow, L. (2001). A framework for assessing estate and gift taxation. In W. Gale, J. R. Hines, & J. Slemrod, *Rethinking estate and gift taxation*. Washington D.C.: Brookings Institution Press.
- Keister, A. (2000). *Wealth in America: Trends in wealth inequality*. New York: Cambridge University Press.
- Kennickell, A. B. (2008). The role of oversampling of the wealthy in the Survey of Consumer Finances. *Irving Fisher Committee Bulletin*, 28, pp. 403-408.
- Kopczuk, W. (2001). *Optimal estate taxation in the steady state*.
- Kopczuk, W. (2013). Taxation of intergenerational transfers and wealth. In A. Auerbach, R. Chetty, M. Feldstein, & E. Saez, *Handbook of Public Economics, Volume 5* (pp. 329-390). Amsterdam: North Holland.
- Krenek, A., & Schratzenstaller, M. (2018). *A European net wealth tax*. WIFO Working Paper No. 561.
- Kuypers, S. (2018). *Financial inclusion for all? A distributional analysis of asset-building policies in Europe*. Mimeo.
- Kuypers, S., & Marx, I. (2018). Estimation of joint income-wealth poverty: A sensitivity analysis. *Social Indicators Research*, 136(1), 117-137.

- Kuypers, S., Figari, F., & Verbist, G. (2016). The Eurosystem Household Finance and Consumption Survey: a new underlying database for EUROMOD. *International Journal of Microsimulation*, 9(3), 35-65.
- Kuypers, S., Figari, F., & Verbist, G. (2019). Redistribution in a joint income-wealth perspective. A cross-country analysis. *Socio-Economic Review*.
- Kuypers, S., Figari, F., & Verbist, G. (2020 forthcoming). *Redistribution in a joint income-wealth perspective: A comparison across 16 countries*. OECD Social, Employment and Migration Working Paper, OECD Publishing: Paris.
- Kuypers, S., Figari, F., Verbist, G., & Verckist, D. (2017). *EWIGE - European Wealth data InteGration in EUROMOD*. JRC Working Papers on Taxation and Structural Reforms No. 4/2017: European Commission, Joint Research Centre, Seville.
- Lambert, P., & Aronson, J. (1993). Inequality decomposition analysis and the Gini coefficient revisited. *Economic Journal*, 1221-1227.
- Lambert, P., & Pfähler, W. (1988). On aggregate measures of the net redistributive impact of taxation and government expenditure. *Public Finance Quarterly*, 16(2), 178-202.
- Lawless, M., & Lynch, D. (2016). *Scenarios and distributional implications of a household wealth tax in Ireland*. ESRI Working Paper No.549.
- Masson, A. (2015). Taxing more post mortem family bequest. In C. Astarita (Ed.), *Taxing wealth: past, present, future* (pp. 48-58). European Economy Discussion Paper No.003, European Commission.
- McDonnell, T. A. (2013). *Wealth tax: Options for its implementation in the republic of Ireland*. NERI Working Paper No. 2013/6.
- McKernan, S.-M., Ratcliffe, C., & Williams Shanks, T. (2012). Is poverty incompatible with asset accumulation? In P. N. Jefferson, *The Oxford Handbook of the Economics of Poverty* (pp. 463-493). Oxford: Oxford University Press.
- Meade, J. E. (1978). *The structure and reform of direct taxation*. London: The Institute for Fiscal Studies
- Milanovic, B. (2016). *Global inequality. A new approach for the age of globalization*. Harvard University Press.
- Musgrave, R., & Thin, T. (1948). Income tax progression, 1929-48. *Journal of Political Economy*, 56(6), 498-514.
- OECD. (2008). *Growing Unequal? Income distribution and poverty in OECD countries*. Paris: OECD Publishing.
- OECD. (2011). *Divided we stand. Why inequality keeps rising*. Paris: OECD Publishing.
- OECD. (2015). *In it together. Why less inequality benefits all*. Paris: OECD Publishing.

- OECD. (2018a). *Taxation of household savings*. OECD Tax Policy Studies No.25. Paris: OECD Publishing.
- OECD. (2018b). *The role and the design of net wealth taxes in the OECD*. OECD Tax Policy Studies No.26. Paris: OECD Publishing.
- Piketty, T. (2011). On the long-run evolution of inheritance: France 1820-2050. *The Quarterly Journal of Economics*, 126(3), 1071-1131.
- Piketty, T. (2014). *Capital in the Twenty-First Century*. Harvard University Press.
- Piketty, T., & Saez, E. (2007). How progressive is the U.S. federal tax system? A historical and international perspective. *Journal of Economic Perspectives*, 21(1), 1-24.
- Piketty, T., & Saez, E. (2012). A theory of optimal capital taxation. *NBER Working Papers 17989*. National Bureau of Economic Research.
- Piketty, T., & Zucman, G. (2015). Wealth and inheritance in the long run. In A. B. Atkinson, & F. Bourguignon, *Handbook of Income Distribution* (pp. 1303-1368). Amsterdam: Elsevier - North Holland.
- Piketty, T., Saez, E., & Zucman, G. (2013). *Rethinking capital and wealth taxation*. Mimeo.
- Plotnick, R. (1981). A measure of horizontal inequity. *Review of Economics and Statistics*, 63(2), 283-288.
- Rakowski, E. (2006). The estate tax compromise. *Economists' Voice*, 3(1), 1-6.
- Reynolds, M., & Smolensky, E. (1977). *Public expenditures, taxes and the distribution of income: the United States, 1950, 1961, 1970*. New York: Academic Press.
- Saez, E. (2002). The desirability of commodity taxation under non-linear income taxation and heterogeneous tastes. *Journal of Public Economics*, 83(2), 217-230.
- Saez, E., & Zucman, G. (2019). *The triumph of injustice. How the rich dodge taxes and how to make them pay*. New York: Norton.
- Scheidel, W. (2017). *The great leveler. Violence and the history of inequality from the Stone Age to the Twenty-First Century*. Princeton University Press.
- Scheve, K., & Stasavage, D. (2016). *Taxing the rich. A history of fiscal fairness in the United States and Europe*. Princeton: Princeton University Press.
- Seim, D. (2017). Behavioral responses to wealth taxes: Evidence from Sweden. *American Economic Journal: Economic Policy*, 9(4), 395-421.
- Sherraden, M. (1991). *Assets and the poor. A new American welfare policy*. Armonk, New York: M.E. Sharpe Inc.
- Spilerman, S. (2000). Wealth and stratification processes. *Annual Review of Sociology*, 26(1), 497-524.

- Spiritus, K. (2017). *Optimizing feasible tax systems with heterogeneous populations*. PhD dissertation: KU Leuven.
- Stiglitz, J. (2016). Inequality and economic growth. In M. Jacobs, & M. Mazzucato, *Rethinking capitalism* (pp. 134-155). New Jersey: Wiley-Blackwell.
- Sutherland, H., & Figari, F. (2013). EUROMOD: the European Union tax-benefit microsimulation model. *International Journal of Microsimulation*, 6(1), 4-26.
- Verbist, G., & Figari, F. (2014). The redistributive effect and progressivity of taxes revisited: An international comparison across the European Union. *Finanz Archiv/Public Finance Analysis*, 70(3), 405-429.
- Vermeulen, P. (2016). Estimating the top tail of the wealth distribution. *American Economic Review*, 106(5), 646-650.
- Vermeulen, P. (2018). How fat is the top tail of the wealth distribution? *Review of Income and Wealth*, 64(2), 357-387.
- Weisbrod, B. A., & Hansen, W. L. (1968). An income-net worth approach to measuring economic welfare. *American Economic Review*, 58(5), 1315-1329.
- Yunker, J. A. (2010). Capital wealth taxation as a potential remedy for excessive capital wealth inequality. *Journal of Post Keynesian Economics*, 33(1), 83-104.
- Zoutman, F. T. (2015). *The effect of capital taxation on households' portfolio composition and intertemporal choice*. mimeo.
- Zucman, G. (2013). The missing wealth of nations: Are Europe and the US net debtors or net creditors? *Quarterly Journal of Economics*, 128(3), 1321-1364.
- Zucman, G. (2015). *The hidden wealth of nations. The scourge of tax havens*. University of Chicago Press.

8 Appendix

This appendix describes the main characteristics of the different types of wealth taxes in the six countries covered in this paper. All characteristics refer to the rules applicable in 2017. The main sources that have been used to collect these data are the EUROMOD country reports¹², Ernst & Young (2014), Taxes in Europe Database¹³ and national legislations.

Table A.1: Overview of characteristics capital income taxes, 2017

Country	Name in national language	Tax schedule	Exemptions, deductions and credits
Belgium	Roerende voorheffing/ Précompte mobilier	Flat tax rate of 30%, exceptional 15% for interests on savings accounts	First €1,880 of interests exempt from taxation
Finland	Pääomatulovero	Up to €30,000: 30% Above €30,000: 34%	Deductions for 45% of paid mortgage interests, for contributions paid to private pension funds (with max of €5,000) and for 15% of listed dividends and 75% of unlisted dividends up to €150,000.
France		<i>Included in progressive tax schedule of personal income tax</i>	Deduction of 40% of dividends.
Germany	Abgeltungsteuer	Flat tax rate of 25% + solidarity surcharge of 5.5%	Allowance of €801 (double for joint taxation)
Italy	Imposte sostitutive sui redditi da capitale	Flat tax rate of 26%, exceptional 12.5% on interests from government bonds and 20% on annuities of (some) private pension funds.	
Spain	Cuota base ahorro	Up to €6,000: 19% Between €6,000 and €50,000: 21% Above €50,000: 23%	

¹² These are available at <https://www.euromod.ac.uk/using-euromod/country-reports>.

¹³ Available at http://ec.europa.eu/taxation_customs/tedb/taxSearch.html

Table A.2: Overview of characteristics real estate taxes, 2017

Country	Name in national language	Tax schedule	Exemptions, deductions and credits
Belgium	Onroerende voorheffing/ Précompte immobilier	<p>The rate includes a basic rate and provincial and municipal surcharges.</p> <ul style="list-style-type: none"> - Basic rate: 2.5% in Flemish Region, 1.25% in Brussels Capital and Walloon Region - Given the absence of municipal information, average surcharges are applied in the simulation: 1,676 centimes in Flemish Region, 3,789 in Brussels Capital Region and 4,200 in Walloon Region <p>Tax is levied on indexed cadastral income.</p>	<p>Tax credit for dependents:</p> <ul style="list-style-type: none"> - Flemish Region: ranging from €7.81 for 2 children up to €55.86 for 10 or more children. (children entitled to child benefits, disabled children count for two): - Walloon Region: €125 per dependent person (at least 2 children alive, tax credit is doubled for disabled) - Brussels Capital Region: 10% tax credit for each dependent child (at least 2 children alive) <p>Tax credit of 25% for main residence if non-indexed cadastral income is lower than €745. In the case of a newly build dwelling the tax credit increases to 50% in first 5 years the tax is due.</p>
Finland	Kiinteistövero	<p>Tax rates are set by municipal governments within statutory limits. At least 2 tax rates need to be set: a general tax rate which may vary between 0.93% and 1.8% and a rate for permanent residences which may vary between 0.41% and 0.9%. Municipalities can also decide to set a special tax rate for secondary residences, which can vary between 0.93% and 1.8%, as well as a rate for unbuilt plots which may vary between 2.0% and 6.0%.</p> <ul style="list-style-type: none"> - Given the absence of municipal information, an average tax rate is applied in the simulation: 0.49% for permanent residences and 1.06% for other property types <p>https://www.veronmaksajat.fi/luvut/Tilastot/Kunnat/Kiinteistovero/</p> <p>Tax is levied on taxable value determined in the 'Act on the Valuation of Assets for Taxation' (1142/2005).</p>	
France	Taxe foncière sur les propriétés bâties et non-bâties	<p>Total tax rate reflects sum of tax rates set at different regional levels which are voted on each year.</p>	<p>Two year exemption for newly build houses</p> <p>Tax liability for main residence for taxpayers with modest income is capped at 50% of income.</p>

		<p>- Given the lack of regional information an average tax rate is implemented in the simulation: 38.08% (source: Barberet & Larquey, 2017, p.16).</p> <p>Tax is levied on deemed rental value (valeur locative cadastrale). Tax base is half of this value for build property and 80% for unbuild land.</p>	Total exemption for main residence if in receipt of 'Allocation aux adultes handicapés' (AHH) or 'Allocation de solidarité aux personnes âgées' (ASPA) or when older than 75 and low income. Tax credit of €100 if between 65 and 75 years and low income.																							
Germany	Grundsteuer	<p>Total tax rates reflect a basic tax rate and a municipal multiplier. Tax rates vary by type of property, between East and West Germany and between municipalities. Given the lack of municipal information an average is applied in the simulation (Federal Statistical Office Germany, 2017):</p> <table border="1"> <tr> <td>Basic tax rate Class A (farms)</td> <td>East & West</td> <td>0.0060%</td> </tr> <tr> <td rowspan="2">Basic tax rate Class B – One-family houses</td> <td>East</td> <td>0.0050%</td> </tr> <tr> <td>West</td> <td>0.0026%</td> </tr> <tr> <td rowspan="2">Basic tax rate Class B – Other property types</td> <td>East</td> <td>0.0060%</td> </tr> <tr> <td>West</td> <td>0.0035%</td> </tr> <tr> <td rowspan="2">Average multiplier Class A</td> <td>East</td> <td>309</td> </tr> <tr> <td>West</td> <td>319</td> </tr> <tr> <td rowspan="2">Average multiplier Class B</td> <td>East</td> <td>441</td> </tr> <tr> <td>West</td> <td>471</td> </tr> </table> <p>Lower tax rate for one-family houses is only applicable to first €15,338.76 in East Germany and €38,346.89 in West Germany, above the rate for other properties applies.</p> <p>Tax is levied on assessed standard value established under the Valuation Law in accordance with 1964 values (1935 for Class B properties in the new Länder).</p>	Basic tax rate Class A (farms)	East & West	0.0060%	Basic tax rate Class B – One-family houses	East	0.0050%	West	0.0026%	Basic tax rate Class B – Other property types	East	0.0060%	West	0.0035%	Average multiplier Class A	East	309	West	319	Average multiplier Class B	East	441	West	471	
Basic tax rate Class A (farms)	East & West	0.0060%																								
Basic tax rate Class B – One-family houses	East	0.0050%																								
	West	0.0026%																								
Basic tax rate Class B – Other property types	East	0.0060%																								
	West	0.0035%																								
Average multiplier Class A	East	309																								
	West	319																								
Average multiplier Class B	East	441																								
	West	471																								
Italy	Imposta Municipale Unica	<p>Tax rates are defined at municipal level. The maximum rate of 1.06% is applied to all properties. Tax is levied on the revaluated cadastral value (i.e. multiplied by 1.05).</p>	Main residences are exempted, with the exception of luxury flats, villas, castles and palaces of historic or artistic importance.																							
Spain	Impuesto sobre bienes inmuebles	<p>Tax rates can be set by municipalities within limits provided in state legislation: 0.4-1.1% for urban properties and 0.3-0.9% for rural properties. Given the lack of municipal information the average urban tax rate of 0.75% (Ernst & Young, 2014) is applied to all properties.</p> <p>Tax is levied on the cadastral value of the property.</p>																								

Table A.3: Overview of characteristics general and specific net wealth taxes, 2017

Country	Name in national language	Eligibility	Tax schedule	Exemptions, deductions and credits																
Belgium	Taks op het langetermijnsparen /Taxe sur l'épargne à long terme	Ownership of individual life insurance, collective and/or individual pension savings account for which the holder has been entitled to a rebate in the personal income tax. <ul style="list-style-type: none"> - Account opened before age 55: on 60th anniversary of owner - Account opened after age 55: on 10th anniversary of the contract 	8% During 2015-2019 each year 1% will be collected in advance.																	
France	Impôt de solidarité sur la fortune	Combined net wealth of fiscal household above €1,300,000 (i.e. not doubled for couples)	<table border="1"> <tr> <td>€800,000 - €1,300,000</td> <td>0.5%</td> </tr> <tr> <td>€1,300,000 - €2,570,000</td> <td>0.7%</td> </tr> <tr> <td>€2,570,000 - €5,000,000</td> <td>1%</td> </tr> <tr> <td>€5,000,000 - €10,000,000</td> <td>1.25%</td> </tr> <tr> <td>>€10,000,000</td> <td>1.5%</td> </tr> </table> <p>Smoothing mechanism: for wealth between €1,300,000 and €1,400,000 a tax credit is granted equal to €17,500 – 1.25% * P, where P is the tax payer's net taxable wealth.</p>	€800,000 - €1,300,000	0.5%	€1,300,000 - €2,570,000	0.7%	€2,570,000 - €5,000,000	1%	€5,000,000 - €10,000,000	1.25%	>€10,000,000	1.5%	<p>The most important exemptions are provided for business assets, forests, life annuities acting as retirement pensions and antiques, art objects and collectors' items. A 30 per cent relief is granted for the main residence.</p> <p>Combined income and wealth tax capped at 75% of income.</p>						
€800,000 - €1,300,000	0.5%																			
€1,300,000 - €2,570,000	0.7%																			
€2,570,000 - €5,000,000	1%																			
€5,000,000 - €10,000,000	1.25%																			
>€10,000,000	1.5%																			
Italy	Imposto di bollo su conto corrente e deposito titoli	Possession of bank accounts or financial assets	0.2%, with minimum tax of €34.20	Bank accounts and bonds issues by the Italian Post Office with annual average value <€5,000 are exempted																
Spain	Impuesto sobre el patrimonio	Individual net wealth above €700,000 (i.e. doubled for couples)	<table border="1"> <tr> <td><€167,129.45</td> <td>0.2%</td> </tr> <tr> <td>€167,129.45 – €334,252.88</td> <td>0.3%</td> </tr> <tr> <td>€334,252.88 - €668,499.75</td> <td>0.5%</td> </tr> <tr> <td>€688,499.75 - €1,336,999.51</td> <td>0.9%</td> </tr> <tr> <td>€1,336,999.51 - €2,673,999.01</td> <td>1.3%</td> </tr> <tr> <td>€2,673,999.01 - €5,347,998.03</td> <td>1.7%</td> </tr> <tr> <td>€5,347,998.03 - €10,695,996.06</td> <td>2.1%</td> </tr> <tr> <td>>€10,695,996.06</td> <td>2.5%</td> </tr> </table> <p>The autonomous regions can change the schedule, but as we have no regional information in HFCS the national legislation is simulated.</p>	<€167,129.45	0.2%	€167,129.45 – €334,252.88	0.3%	€334,252.88 - €668,499.75	0.5%	€688,499.75 - €1,336,999.51	0.9%	€1,336,999.51 - €2,673,999.01	1.3%	€2,673,999.01 - €5,347,998.03	1.7%	€5,347,998.03 - €10,695,996.06	2.1%	>€10,695,996.06	2.5%	<p>Main residence exempted until €300,000</p> <p>Exemptions for household contents, works of art and antiquities (under certain conditions), pension rights, intellectual property rights, business assets (under certain conditions).</p>
<€167,129.45	0.2%																			
€167,129.45 – €334,252.88	0.3%																			
€334,252.88 - €668,499.75	0.5%																			
€688,499.75 - €1,336,999.51	0.9%																			
€1,336,999.51 - €2,673,999.01	1.3%																			
€2,673,999.01 - €5,347,998.03	1.7%																			
€5,347,998.03 - €10,695,996.06	2.1%																			
>€10,695,996.06	2.5%																			

Table A.4: Overview of characteristics real estate transfer taxes, 2017

Country	Name in national language	Tax schedule	Exemptions, deductions and credits
Belgium	Registratie- en hypotheekrechten/ Droits d'enregistrement et d'hypothèque	10% in Flemish Region, 12.5% in Walloon and Brussels Capital Region Reduced rates for modest houses (non-indexed cadastral income below €745, increased if more than 2 dependent children): 5% in Flemish Region and 6% in Walloon and Brussels Capital Region 1% on registration of mortgage	Exemption for main residence if not yet owner of other real estate: €15,000 in Flemish Region, €175,000 in Brussels Capital Region (provided that tax base is below €500,000). In Flemish Region additional exemption of €10,000 if taxed at general rate and €20,000 if taxed a reduced rate for modest houses conditional on being eligible for general exemption and taking out a mortgage on property within 2 years.
Finland	Varainsiirtovero	<i>Not simulated</i>	<i>Not simulated</i>
France	Droits de vente d'immeubles	Total tax rate is 5.8% and reflects sum of several tax rates: - 4.5% departmental tax rate (lower for some departments) - 1.2% municipal tax rate - Levy for collection costs of 2.37% of departmental tax rate	Possibility for departments to provide abatement for main residence between €7,600 and €46,000 in fractions of €7,600 (most do not).
Germany	Grunderwerbsteuer	The basic tax rate is 3.5%, but since 1 January 2007 the Länder can determine the tax rate. In 2017 all except 2 (Bayern & Sachsen) have increased the tax rate. Given the absence of regional information an average rate of 5.3% is applied in the simulation (https://www.zinsen- berechnen.de/grunderwerbsteuer/bundeslaender.php).	
Italy	Imposta di registro, ipotecaria e catastale	- Registration Duty (Imposta di Registro): between 2% (main residence) and 9% (other transactions) - Mortgage Duty (Imposta Ipotecaria): fixed amount of €50 - Cadastral Duty (Imposta Catastale): fixed amount of €50	
Spain	Impuesto sobre transmisiones patrimoniales y actos jurídicos documentados	The general tax rate is 6%, but the autonomous regions have set rates between 8 and 10%. Given the lack of regional information an average of 8.2% is applied in the simulation. 1.5% for registering the transfer of immovable property	

Table A.5: Overview of characteristics inheritance & gift taxes, 2017

Country	Name in national language	Tax schedule	Exemptions, deductions and credits																																												
Belgium	Successie- en schenkingsrechten/ Droits de succession et donation	<p>Rates are progressive and vary by region, relationship between the donor and recipient and between gifts and inheritances¹⁴.</p> <ul style="list-style-type: none"> - Inheritances in Flemish Region (FL): <ul style="list-style-type: none"> o Between lineal relatives and partners (separate calculation for movable and immovable assets): <table border="1"> <tr><td><€50,000</td><td>3%</td></tr> <tr><td>€50,000 - €250,000</td><td>9%</td></tr> <tr><td>>€250,000</td><td>27%</td></tr> </table> o Siblings & others (for others rates are applicable to total inheritance, not individual share): <table border="1"> <thead> <tr><th></th><th>Siblings</th><th>Others</th></tr> </thead> <tbody> <tr><td><€75,000</td><td>30%</td><td>45%</td></tr> <tr><td>€75,000 - €125,000</td><td>55%</td><td>55%</td></tr> <tr><td>>€125,000</td><td>65%</td><td>65%</td></tr> </tbody> </table> - Inheritances in Walloon Region (WA): <ul style="list-style-type: none"> o Between lineal relatives and partners: <table border="1"> <tr><td><€12,500</td><td>3%</td></tr> <tr><td>€12,500 - €25,000</td><td>4%</td></tr> <tr><td>€25,000 - €50,000</td><td>5%</td></tr> <tr><td>€50,000 - €100,000</td><td>7%</td></tr> <tr><td>€100,000 - €150,000</td><td>10%</td></tr> <tr><td>€150,000 - €200,000</td><td>14%</td></tr> <tr><td>€200,000 - €250,000</td><td>18%</td></tr> <tr><td>€250,000 - €500,000</td><td>24%</td></tr> <tr><td>>€500,000</td><td>30%</td></tr> </table> o Others: <table border="1"> <thead> <tr><th></th><th>Siblings</th><th>Other rel.</th><th>Others</th></tr> </thead> <tbody> <tr><td><€12,500</td><td>20%</td><td>25%</td><td>30%</td></tr> </tbody> </table> 	<€50,000	3%	€50,000 - €250,000	9%	>€250,000	27%		Siblings	Others	<€75,000	30%	45%	€75,000 - €125,000	55%	55%	>€125,000	65%	65%	<€12,500	3%	€12,500 - €25,000	4%	€25,000 - €50,000	5%	€50,000 - €100,000	7%	€100,000 - €150,000	10%	€150,000 - €200,000	14%	€200,000 - €250,000	18%	€250,000 - €500,000	24%	>€500,000	30%		Siblings	Other rel.	Others	<€12,500	20%	25%	30%	<p>Personal tax credits (FL):</p> <ul style="list-style-type: none"> - Lineal heirs & partners: €500 * (1-inheritance share/€50,000) (main residence is not taken into account in inheritance share) - Children younger than 21 years: €75 for each year below 21 years - Siblings: <ul style="list-style-type: none"> o Inheritance share <€18,750: €2,000 * (inheritance share/€20,000) o Inheritance share >€18,750: €2,500 * (1-inheritance share/€75,000) - Others: <ul style="list-style-type: none"> o Total inheritance <€12,500: €2,000 * (total inheritance/€12,500) o Total inheritance >€12,500: €2,400 * (1-total inheritance/€75,000) <p>Personal exemptions (WA):</p> <ul style="list-style-type: none"> - Lineal heirs & partners & siblings of deceased minor : €12,500, doubled when inheritance share <€125,000 - Children of deceased younger than 21 years additional €2,500 for each year below 21 <p>Personal exemptions (BR):</p> <ul style="list-style-type: none"> - Lineal heirs & partners: €15,000 - Children of deceased younger than 21 years additional €2,500 for each year below 21
<€50,000	3%																																														
€50,000 - €250,000	9%																																														
>€250,000	27%																																														
	Siblings	Others																																													
<€75,000	30%	45%																																													
€75,000 - €125,000	55%	55%																																													
>€125,000	65%	65%																																													
<€12,500	3%																																														
€12,500 - €25,000	4%																																														
€25,000 - €50,000	5%																																														
€50,000 - €100,000	7%																																														
€100,000 - €150,000	10%																																														
€150,000 - €200,000	14%																																														
€200,000 - €250,000	18%																																														
€250,000 - €500,000	24%																																														
>€500,000	30%																																														
	Siblings	Other rel.	Others																																												
<€12,500	20%	25%	30%																																												

¹⁴ Here, we only describe the tax schedule and exemptions, deductions, credits applicable to inheritances as these are most commonly taxed, among others because gifts of movable assets are only taxed when officially registered, which is very uncommon. The tax schedule and exemptions, deductions, credits applicable to gifts in Belgium can be found in the Tax Survey (Federal Public Service Finance, 2017).

		<table border="1"> <tr> <td>€12,500 - €25,000</td> <td>25%</td> <td>30%</td> <td>35%</td> </tr> <tr> <td>€25,000 - €75,000</td> <td>35%</td> <td>40%</td> <td>60%</td> </tr> <tr> <td>€75,000 - €175,000</td> <td>50%</td> <td>55%</td> <td>80%</td> </tr> <tr> <td>>€175,000</td> <td>65%</td> <td>70%</td> <td>80%</td> </tr> </table> <p>- Inheritances in Brussels Capital Region (BR):</p> <ul style="list-style-type: none"> o Between lineal relatives and partners: <table border="1"> <tr> <td><€50,000</td> <td>3%</td> </tr> <tr> <td>€50,000 - €100,000</td> <td>8%</td> </tr> <tr> <td>€100,000 - €175,000</td> <td>9%</td> </tr> <tr> <td>€175,000 - €250,000</td> <td>18%</td> </tr> <tr> <td>€250,000 - €500,000</td> <td>24%</td> </tr> <tr> <td>>€500,000</td> <td>30%</td> </tr> </table> o Between siblings: <table border="1"> <tr> <td><€12,500</td> <td>20%</td> </tr> <tr> <td>€12,500 - €25,000</td> <td>25%</td> </tr> <tr> <td>€25,000 - €50,000</td> <td>30%</td> </tr> <tr> <td>€50,000 - €100,000</td> <td>40%</td> </tr> <tr> <td>€100,000 - €175,000</td> <td>55%</td> </tr> <tr> <td>€175,000 - €250,000</td> <td>60%</td> </tr> <tr> <td>>€250,000</td> <td>65%</td> </tr> </table> o Other relatives: <table border="1"> <tr> <td><€50,000</td> <td>35%</td> </tr> <tr> <td>€50,000 - €100,000</td> <td>50%</td> </tr> <tr> <td>€100,000 - €175,000</td> <td>60%</td> </tr> <tr> <td>>€175,000</td> <td>70%</td> </tr> </table> o Others: <table border="1"> <tr> <td><€50,000</td> <td>40%</td> </tr> <tr> <td>€50,000 - €75,000</td> <td>55%</td> </tr> <tr> <td>€75,000 - €175,000</td> <td>65%</td> </tr> <tr> <td>>€175,000</td> <td>80%</td> </tr> </table> 	€12,500 - €25,000	25%	30%	35%	€25,000 - €75,000	35%	40%	60%	€75,000 - €175,000	50%	55%	80%	>€175,000	65%	70%	80%	<€50,000	3%	€50,000 - €100,000	8%	€100,000 - €175,000	9%	€175,000 - €250,000	18%	€250,000 - €500,000	24%	>€500,000	30%	<€12,500	20%	€12,500 - €25,000	25%	€25,000 - €50,000	30%	€50,000 - €100,000	40%	€100,000 - €175,000	55%	€175,000 - €250,000	60%	>€250,000	65%	<€50,000	35%	€50,000 - €100,000	50%	€100,000 - €175,000	60%	>€175,000	70%	<€50,000	40%	€50,000 - €75,000	55%	€75,000 - €175,000	65%	>€175,000	80%	<p>Full exemption when inheritance share <€1,250 (BR)/ <€620 (WA)</p> <p>Tax credit for heirs with at least 3 children below 21 years old (WA & BR): 2% tax credit, maximum €62 per child below 21 years (doubled if partner of deceased)</p> <p>Tax exemption for disabled persons (FL): €3,000 for lineal heirs and partners/€1,000 for other heirs, each time multiplied by disability coefficient</p> <p>Inheritance of family business: reduced tax rates (FL & BR), full tax exemption (WA)</p> <p>Inheritance of family home: full exemption for partners (FL), reduced tax rates for lineal heirs and partners (WA), full exemption for partners & reduced rates for lineal heirs (BR)</p> <p>Most of the exemptions are foot exemptions, i.e. they apply to the lowest tax brackets while preserving the application of the higher progressive tax rates.</p>
€12,500 - €25,000	25%	30%	35%																																																										
€25,000 - €75,000	35%	40%	60%																																																										
€75,000 - €175,000	50%	55%	80%																																																										
>€175,000	65%	70%	80%																																																										
<€50,000	3%																																																												
€50,000 - €100,000	8%																																																												
€100,000 - €175,000	9%																																																												
€175,000 - €250,000	18%																																																												
€250,000 - €500,000	24%																																																												
>€500,000	30%																																																												
<€12,500	20%																																																												
€12,500 - €25,000	25%																																																												
€25,000 - €50,000	30%																																																												
€50,000 - €100,000	40%																																																												
€100,000 - €175,000	55%																																																												
€175,000 - €250,000	60%																																																												
>€250,000	65%																																																												
<€50,000	35%																																																												
€50,000 - €100,000	50%																																																												
€100,000 - €175,000	60%																																																												
>€175,000	70%																																																												
<€50,000	40%																																																												
€50,000 - €75,000	55%																																																												
€75,000 - €175,000	65%																																																												
>€175,000	80%																																																												
Finland	Perintö- ja lahjavero	<i>Not simulated</i>	<i>Not simulated</i>																																																										
France	Droits de mutation à titre gratuit par décès ou entre vifs	<p>Rates vary by relationship between the donor and recipient:</p> <ul style="list-style-type: none"> - In a direct line and between spouses or civil partners (latter only for gifts): <table border="1"> <tr> <td><€8,072</td> <td>5%</td> </tr> </table> 	<€8,072	5%	<p>Allowances in the case of inheritance:</p> <ul style="list-style-type: none"> - Spouse or civil partner: total amount - Child: €100,000 - Disabled: €159,325 																																																								
<€8,072	5%																																																												

		<table border="1"> <tr> <td>€8,072 - €12,109</td> <td>10%</td> </tr> <tr> <td>€12,109 - €15,932</td> <td>15%</td> </tr> <tr> <td>€15,932 - €552,324</td> <td>20%</td> </tr> <tr> <td>€552,324 - €902,838</td> <td>30%</td> </tr> <tr> <td>€902,838 - €1,805,677</td> <td>40%</td> </tr> <tr> <td>> €1,805,677</td> <td>45%</td> </tr> </table> <ul style="list-style-type: none"> - Between siblings: 35% until €24,430 and 45% above - Between relatives of the fourth degree or further: 55% - Between all other persons: 60% 	€8,072 - €12,109	10%	€12,109 - €15,932	15%	€15,932 - €552,324	20%	€552,324 - €902,838	30%	€902,838 - €1,805,677	40%	> €1,805,677	45%	<ul style="list-style-type: none"> - Sibling: €15,932 - Nephew/niece: €7,967 - Other: € 1,594 <p>Allowances in the case of gifts:</p> <ul style="list-style-type: none"> - Spouse or civil partner: €80,724 - Child: €100,000 - Disabled: €159,325 - Grandchild: €31,865 - Great grandchild: €5,310 																				
€8,072 - €12,109	10%																																		
€12,109 - €15,932	15%																																		
€15,932 - €552,324	20%																																		
€552,324 - €902,838	30%																																		
€902,838 - €1,805,677	40%																																		
> €1,805,677	45%																																		
Germany	Erbschaft- und schenkungsteuer	<p>Rates vary by relationship between the donor and recipient:</p> <table border="1"> <thead> <tr> <th></th> <th>Class 1</th> <th>Class 2</th> <th>Class 3</th> </tr> </thead> <tbody> <tr> <td><€75,000</td> <td>7%</td> <td>15%</td> <td>30%</td> </tr> <tr> <td>€75,000 - €300,000</td> <td>11%</td> <td>20%</td> <td>30%</td> </tr> <tr> <td>€300,000 - €600,000</td> <td>15%</td> <td>25%</td> <td>30%</td> </tr> <tr> <td>€600,000 - €6,000,000</td> <td>19%</td> <td>30%</td> <td>50%</td> </tr> <tr> <td>€6,000,000 - €13,000,000</td> <td>23%</td> <td>35%</td> <td>50%</td> </tr> <tr> <td>€13,000,000 - €26,000,000</td> <td>27%</td> <td>40%</td> <td>50%</td> </tr> <tr> <td>>€26,000,000</td> <td>30%</td> <td>43%</td> <td>50%</td> </tr> </tbody> </table> <p>Class 1 includes spouses and partners of registered partnerships, (step-)children, grandchildren, parents and ancestors (the latter 2 only in the case of inheritance).</p> <p>Class 2 includes parents and ancestors in the case of gift, siblings, 1st degree descendants of siblings, step-parents, children-in-law, parents-in-law, divorced spouse and partners of dissolved registered partnership.</p> <p>Class 3 includes all other individuals and legal entities.</p>		Class 1	Class 2	Class 3	<€75,000	7%	15%	30%	€75,000 - €300,000	11%	20%	30%	€300,000 - €600,000	15%	25%	30%	€600,000 - €6,000,000	19%	30%	50%	€6,000,000 - €13,000,000	23%	35%	50%	€13,000,000 - €26,000,000	27%	40%	50%	>€26,000,000	30%	43%	50%	<p>Personal exemptions:</p> <ul style="list-style-type: none"> - Partner: €500,000 - Children: €400,000 - Grandchildren: €200,000 - Other persons in Class 1: €100,000 - Persons in Class 2 & 3: €20,000 <p>Maintenance allowance:</p> <ul style="list-style-type: none"> - Partner: €256,000 - Children: ranges from €52,000 up to age 5 to €10,300 between age 20 and 27 <p>Exemption for valuables:</p> <ul style="list-style-type: none"> - Class 1 beneficiaries: €41,000 for household effects, €12,000 art objects & collections - Class 2 & 3 beneficiaries: €12,000 for both together <p>Exemption for family home: full exemption for partners, full exemption for children limited to living area of 200m²</p> <p>Exemption for business assets: generally 85% (but can be 100% or lower than 85% depending on conditions)</p>
	Class 1	Class 2	Class 3																																
<€75,000	7%	15%	30%																																
€75,000 - €300,000	11%	20%	30%																																
€300,000 - €600,000	15%	25%	30%																																
€600,000 - €6,000,000	19%	30%	50%																																
€6,000,000 - €13,000,000	23%	35%	50%																																
€13,000,000 - €26,000,000	27%	40%	50%																																
>€26,000,000	30%	43%	50%																																
Italy	Imposta di successione e donazione	Flat tax rates which vary by relationship between the donor and recipient:	<p>Personal exemptions:</p> <ul style="list-style-type: none"> - €1,000,000 for lineal heirs & spouses 																																

		<table border="1"> <tr> <td>Lineal heirs & spouses</td> <td>4%</td> </tr> <tr> <td>Siblings</td> <td>6%</td> </tr> <tr> <td>Other relatives</td> <td>6%</td> </tr> <tr> <td>Others</td> <td>8%</td> </tr> </table> <p>Assets are assessed at market value with the exception of real estate for which revaluated cadastral values are used.</p>	Lineal heirs & spouses	4%	Siblings	6%	Other relatives	6%	Others	8%	- €100,000 for siblings																																				
Lineal heirs & spouses	4%																																														
Siblings	6%																																														
Other relatives	6%																																														
Others	8%																																														
Spain	Impuesto sobre sucesiones y donaciones	<p>Tax schedule varies across autonomous regions, but given the absence of regional information in the HFCS the national legislation is applied (the tax schedules of Andalusia and Valencia, two of the most populous regions, are highly similar).</p> <table border="1"> <tr> <td><€7,993.46</td> <td>7.65%</td> </tr> <tr> <td>€7,993.46 - €15,980.81</td> <td>8.50%</td> </tr> <tr> <td>€15,980.82 - €23,968.36</td> <td>9.35%</td> </tr> <tr> <td>€23,968.36 - €31,955.81</td> <td>10.20%</td> </tr> <tr> <td>€31,955.81 - €39,943.26</td> <td>11.05%</td> </tr> <tr> <td>€39,943.26 - €47,930.72</td> <td>11.90%</td> </tr> <tr> <td>€47,930.72 - €55,918.17</td> <td>12.75%</td> </tr> <tr> <td>€55,918.17 - €63,905.62</td> <td>13.60%</td> </tr> <tr> <td>€63,905.62 - €71,893.07</td> <td>14.45%</td> </tr> <tr> <td>€71,893.07 - €79,880.52</td> <td>15.30%</td> </tr> <tr> <td>€79,880.52 - €119,757.67</td> <td>16.15%</td> </tr> <tr> <td>€119,757.67 - €159,634.83</td> <td>18.70%</td> </tr> <tr> <td>€159,634.83 - €239,389.13</td> <td>21.25%</td> </tr> <tr> <td>€239,389.13 - €398,777.54</td> <td>25.50%</td> </tr> <tr> <td>€398,777.54 - €797,555.08</td> <td>29.75%</td> </tr> <tr> <td>> €797,555.08</td> <td>34.00%</td> </tr> </table> <p>The tax liability is subject to a multiplier depending on the relationship between donor and recipient and the wealth of the recipient prior to the inheritance/gift:</p> <table border="1"> <thead> <tr> <th></th> <th>Group 1&2</th> <th>Group 3</th> <th>Group 4</th> </tr> </thead> <tbody> <tr> <td><€402,678.11</td> <td>1.0000</td> <td>1.5882</td> <td>2.0000</td> </tr> <tr> <td>€402,678.11 - €2,007,380.43</td> <td>1.0500</td> <td>1.6676</td> <td>2.1000</td> </tr> </tbody> </table>	<€7,993.46	7.65%	€7,993.46 - €15,980.81	8.50%	€15,980.82 - €23,968.36	9.35%	€23,968.36 - €31,955.81	10.20%	€31,955.81 - €39,943.26	11.05%	€39,943.26 - €47,930.72	11.90%	€47,930.72 - €55,918.17	12.75%	€55,918.17 - €63,905.62	13.60%	€63,905.62 - €71,893.07	14.45%	€71,893.07 - €79,880.52	15.30%	€79,880.52 - €119,757.67	16.15%	€119,757.67 - €159,634.83	18.70%	€159,634.83 - €239,389.13	21.25%	€239,389.13 - €398,777.54	25.50%	€398,777.54 - €797,555.08	29.75%	> €797,555.08	34.00%		Group 1&2	Group 3	Group 4	<€402,678.11	1.0000	1.5882	2.0000	€402,678.11 - €2,007,380.43	1.0500	1.6676	2.1000	<p>Personal exemptions:</p> <ul style="list-style-type: none"> - Group 1: €15,956.87 increased with €3,990.72 for each year they are below 21 years old, with maximum of €47,858.59 - Group 2: €15,956.87 - Group 3: €7,993.46 - Disabled beneficiaries: €47,858.59 <p>Exemption of 95% of main residence for ascendants and descendants, with maximum of €122,606.47</p> <p>Total exemption of life insurance with maximum of €9,159.49</p>
<€7,993.46	7.65%																																														
€7,993.46 - €15,980.81	8.50%																																														
€15,980.82 - €23,968.36	9.35%																																														
€23,968.36 - €31,955.81	10.20%																																														
€31,955.81 - €39,943.26	11.05%																																														
€39,943.26 - €47,930.72	11.90%																																														
€47,930.72 - €55,918.17	12.75%																																														
€55,918.17 - €63,905.62	13.60%																																														
€63,905.62 - €71,893.07	14.45%																																														
€71,893.07 - €79,880.52	15.30%																																														
€79,880.52 - €119,757.67	16.15%																																														
€119,757.67 - €159,634.83	18.70%																																														
€159,634.83 - €239,389.13	21.25%																																														
€239,389.13 - €398,777.54	25.50%																																														
€398,777.54 - €797,555.08	29.75%																																														
> €797,555.08	34.00%																																														
	Group 1&2	Group 3	Group 4																																												
<€402,678.11	1.0000	1.5882	2.0000																																												
€402,678.11 - €2,007,380.43	1.0500	1.6676	2.1000																																												

		<table border="1"> <tr> <td>€2,007,380.43 - €4,020,770.98</td> <td>1.1000</td> <td>1.7471</td> <td>2.2000</td> </tr> <tr> <td>> €4,020,770.98</td> <td>1.2000</td> <td>1.9059</td> <td>2.4000</td> </tr> </table>	€2,007,380.43 - €4,020,770.98	1.1000	1.7471	2.2000	> €4,020,770.98	1.2000	1.9059	2.4000		
€2,007,380.43 - €4,020,770.98	1.1000	1.7471	2.2000									
> €4,020,770.98	1.2000	1.9059	2.4000									
		<p>Group 1 consists of children under 21 years, group 2 consists of children above 21 years, grandchildren, parents, grandparents and partners, group 3 includes in-laws and their ascendants/descendants, stepchildren, siblings, nieces/nephews and aunts/uncles, group 4 covers all other persons.</p>										

Table A.6: Kakwani indices (gross wealth)

		Capital income tax	Real property tax	General/specific net wealth tax	Real property transfer tax	Inheritance & gift tax	Total
BE	Stock of wealth	0.159* (0.024)	-0.019* (0.007)	0.222* (0.043)	-0.053 (0.033)	-0.021 (0.074)	-0.012 (0.017)
	Annuitized wealth	0.160* (0.022)	-0.040* (0.006)	0.195* (0.037)	-0.187* (0.036)	0.063 (0.100)	-0.047 (0.030)
	Joint income-wealth	0.377* (0.024)	0.156* (0.008)	0.380* (0.044)	0.013 (0.046)	0.294* (0.101)	0.158* (0.032)
FI	Stock of wealth	0.273* (0.014)	-0.082* (0.005)				0.127* (0.006)
	Annuitized wealth	0.246* (0.007)	-0.099* (0.005)				0.101* (0.006)
	Joint income-wealth	0.489* (0.010)	0.122* (0.004)				0.335* (0.009)
FR	Stock of wealth		-0.019* (0.005)	0.362* (0.006)	-0.075* (0.023)	0.135* (0.029)	0.080* (0.010)
	Annuitized wealth		-0.038* (0.005)	0.338* (0.005)	-0.148* (0.024)	0.098* (0.047)	0.049* (0.016)
	Joint income-wealth		0.225* (0.005)	0.626* (0.005)	0.158* (0.028)	0.330* (0.063)	0.315* (0.018)
DE	Stock of wealth	0.071 (0.039)	0.032* (0.004)		-0.049 (0.029)	-0.002 (0.098)	0.009 (0.016)
	Annuitized wealth	0.074* (0.036)	0.022* (0.003)		-0.084* (0.037)	-0.022 (0.095)	-0.013 (0.018)
	Joint income-wealth	0.342* (0.048)	0.267* (0.007)		0.131* (0.059)	0.312* (0.070)	0.237* (0.026)
IT	Stock of wealth	0.086* (0.009)	0.186* (0.005)	-0.264* (0.012)	-0.071* (0.035)	-0.037 (0.099)	0.121* (0.005)
	Annuitized wealth	0.076* (0.008)	0.159* (0.005)	-0.240* (0.011)	-0.174* (0.038)	0.016 (0.087)	0.101* (0.005)
	Joint income-wealth	0.308* (0.008)	0.329* (0.007)	-0.027* (0.011)	0.066 (0.041)	0.177* (0.098)	0.295* (0.006)
ES	Stock of wealth	0.233* (0.026)	-0.046* (0.004)	0.450* (0.007)	0.028 (0.034)	0.172* (0.042)	0.063* (0.013)
	Annuitized wealth	0.215* (0.023)	-0.059* (0.004)	0.416* (0.006)	-0.067* (0.033)	0.125* (0.040)	0.027* (0.013)
	Joint income-wealth	0.361* (0.025)	0.055* (0.004)	0.574* (0.005)	0.100* (0.046)	0.229* (0.060)	0.157* (0.018)

Note: Standard errors are shown between parentheses, * denotes that kakwani index is significantly different from zero (at 5% confidence level), i.e. significantly different from proportionality

Source: Own calculations based on HFCS-EUROMOD simulations

Table A.7: Redistributive effect of wealth taxes

Country	Gross wealth			Net wealth		
	Gini pre-tax	Gini post-tax	RE	Gini pre-tax	Gini post-tax	RE
Stock of wealth framework						
Belgium	0.524 (0.009)	0.525 (0.009)	0.000 (0.000)	0.588 (0.009)	0.590 (0.009)	-0.002* (0.000)
Finland	0.529 (0.005)	0.528 (0.005)	0.000* (0.000)	0.671 (0.005)	0.671 (0.005)	-0.001* (0.000)
France	0.629 (0.005)	0.629 (0.005)	0.000* (0.000)	0.675 (0.005)	0.675 (0.005)	0.000* (0.000)
Germany	0.709 (0.008)	0.709 (0.008)	0.000* (0.000)	0.745 (0.007)	0.745 (0.007)	0.000 (0.000)
Italy	0.585 (0.004)	0.584 (0.004)	0.001* (0.000)	0.600 (0.004)	0.600 (0.004)	0.001* (0.000)
Spain	0.547 (0.007)	0.547 (0.007)	0.000* (0.000)	0.572 (0.007)	0.572 (0.007)	0.000 (0.000)
Annuitized wealth framework						
Belgium	0.570 (0.009)	0.572 (0.009)	-0.002* (0.000)	0.631 (0.008)	0.634 (0.008)	-0.003* (0.000)
Finland	0.556 (0.005)	0.553 (0.005)	0.003* (0.000)	0.690 (0.005)	0.686 (0.005)	0.004* (0.001)
France	0.653 (0.005)	0.651 (0.005)	0.001* (0.000)	0.698 (0.005)	0.697 (0.005)	0.001* (0.000)
Germany	0.724 (0.007)	0.724 (0.007)	0.000 (0.000)	0.758 (0.007)	0.758 (0.007)	0.000 (0.000)
Italy	0.608 (0.004)	0.604 (0.004)	0.004* (0.000)	0.623 (0.004)	0.620 (0.004)	0.003* (0.000)
Spain	0.580 (0.006)	0.581 (0.006)	0.000 (0.000)	0.606 (0.006)	0.606 (0.006)	0.000 (0.000)
Joint income-annuitized wealth framework						
Belgium	0.330 (0.007)	0.329 (0.007)	0.002* (0.000)	0.339 (0.007)	0.338 (0.007)	0.002* (0.000)
Finland	0.261 (0.002)	0.258 (0.002)	0.004* (0.000)	0.264 (0.002)	0.260 (0.002)	0.004* (0.000)
France	0.356 (0.004)	0.352 (0.004)	0.004* (0.000)	0.356 (0.004)	0.352 (0.004)	0.004* (0.000)
Germany	0.412 (0.006)	0.410 (0.006)	0.001* (0.000)	0.411 (0.006)	0.410 (0.006)	0.001* (0.000)
Italy	0.393 (0.004)	0.388 (0.003)	0.005* (0.000)	0.394 (0.004)	0.389 (0.003)	0.005* (0.000)
Spain	0.423 (0.005)	0.421 (0.005)	0.001* (0.000)	0.429 (0.005)	0.427 (0.005)	0.001* (0.000)

Note: The difference between gross and net wealth reflects taking into account outstanding debt. In the joint income-annuitized wealth framework pre-tax and post-tax only refers to the inclusion of wealth taxes, they are always post income tax. Standard errors are shown between parentheses, * denotes a 1% statistically significant difference between pre-tax and post-tax Gini (at higher significance level all other RE's are still not significant).

Source: Own calculations based on HFCS-EUROMOD simulations