Improving the Incorporation of Wealth Data in Policy Modelling. Converting the Household Finance and Consumption Survey (HFCS) for Microsimulation Purposes

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Improving the incorporation of wealth data in policy modelling. Converting the Eurosystem Household Finance and Consumption Survey for microsimulation purposes[1]

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Abstract

The need for more comprehensive and integrated data on individual well-being is widely recognised. In order to identify better measures of economic performance in a complex economy and thus going Beyond GDP, Stiglitz, Sen and Fitoussi (2009) recommend to consider income, consumption and wealth and to give more prominence to their joint distribution. New household surveys as those developed as part of the Luxembourg Wealth Study and the Eurosystem Household Finance and Consumption Network (HFCS) represent a milestone in the ongoing process to better measure individual well-being. We explore the prospects for using the HFCS dataset as an underlying micro-database for the EU tax-benefit model, EUROMOD. The purpose of this paper is twofold. On the one hand, as the HFCS only contains gross income amounts which are not suitable for redistributive analysis, we derive net incomes by simulating the gross-to-net transition with EUROMOD taking into account all important details of the social security and personal income system. On the other hand, we discuss the expansion of new policy domains introduced into the EUROMOD simulations such as wealth taxation, incentives for wealth accumulation and asset tests determining benefit eligibility. We consider a selection of six EU countries.

Key words: EUROMOD, HFCS, simulations, gross-to-net incomes, wealth policies

JEL Classification: C15, H24, I3

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1 Introduction

Various studies have pointed towards increased income inequality over the past decades in many OECD countries, thereby also devoting attention to the role played by wealth (see e.g. OECD, 2015; Piketty, 2014; Piketty and Saez, 2013; Jäntti, Sierminska & Smeeding, 2008). In this context the need for more comprehensive and integrated data on individual well-being is widely recognised, as e.g. highlighted in the Report by the Commission on the Measurement of Economic Performance and Social Progress (Stiglitz, Sen & Fitoussi, 2009). For the component of wealth new household surveys as those developed as part of the Luxembourg Wealth Study (Jäntti, Sierminska & Van Kerm, 2013) and the Eurosystem Household Finance and Consumption Network (HFCN, 2013a) represent a milestone. These databases can also be the corner stone for the analysis of policies that have been put forward as a way to reduce inequality, such as wealth taxation (e.g. Piketty, 2014). For this purpose it is important to assess the role of the different wealth components across countries, in order to set appropriate tax-free allowances and concentrate the tax burden on the wealthy part of the population, given the increasing role of housing assets in the household's portfolio along the entire income distribution (Figari, 2013).

This paper contributes to the recent developments in wealth policy analysis by exploring the prospects for using the Eurosystem Household Finance and Consumption Survey (HFCS) dataset as an underlying database for the EU-wide tax-benefit microsimulation model, EUROMOD. To be able to run EUROMOD on the HFCS data will allow many new empirical research possibilities. First, it allows to analyse the joint distribution of disposable income and net wealth based on information from the same survey, potentially comparable across countries and time. As the HFCS contains only gross income amounts which are not suitable for distributive analysis, we derive net incomes by simulating the gross-to-net transition with EUROMOD taking into account all important details of the social security and personal income tax system.

Second, by expanding the policy domains currently simulated in EUROMOD with dimensions like wealth taxation and asset building incentives this research opens up many new perspectives on tax-benefit analyses. For example, it allows to analyse the budgetary and distributional impact of recurrent and event-based wealth taxes, such as real property taxes, net wealth taxes and inheritance and gift taxes. Moreover, the HFCS based model will allow to tackle challenging issues such as those faced by 'asset rich/income poor' households (Hills, 2013) by enabling an integrated assessment of direct taxes on both income and wealth. Furthermore, policies which encourage asset accumulation, such as tax deductions for mortgage interest repayment or for contributions made to private pensions funds, can also be analysed. Finally, in all these domains we will be able to estimate the impact of (potential) reforms, also in interaction with other tax-benefit policies. In order to demonstrate these new research possibilities we create a EUROMOD input dataset based on the HFCS and extend the simulated policies for six EU countries, namely Belgium, Finland, France, Germany, Italy and Spain.

The remainder of this paper is organised as follows. In section 2 we briefly discuss the HFCS data and the motivation to focus on the six countries in question. The following section describes how the construction of the HFCS based EUROMOD input dataset is achieved in practice, i.e. what are the advantages and pitfalls and the necessary assumptions. Section 4 then validates the results of the derivation of net incomes for the HFCS data by comparing them against those obtained based on the current underlying database, EU-SILC. We provide a brief overview of the wealth policies which were refined and added to the simulations in EUROMOD in section 5. We also validate the outcomes in terms of aggregate tax revenue against external figures and illustrate how the incidence of wealth taxes is spread across the income distribution. Section 6 provides some illustrative examples of research possibilities using the new tool. The last section concludes.

2 The HFCS data and choice of countries

The Eurosystem Household Finance and Consumption Survey (HFCS) is a new dataset covering detailed household wealth, gross income and consumption information. It is the result of a joint effort of all National Banks of the Euro zone, three National Statistical Institutes and the European Central Bank (ECB). The HFCS will be conducted every three years and most countries plan to set it up as a panel from the second wave onwards. Similarly to EU-SILC, the HFCS survey has a probabilistic sample design which only includes individuals living in private households, i.e. institutionalised and homeless citizens are excluded from the target population. The HFCS target sample also includes only those living in the respective country were the survey was conducted, such that non-residents are excluded (HFCN, 2013a).

The first wave of the HFCS was made available to researchers in April 2013 and contains ex-ante harmonised information on more than 62,000 households in 15 Euro area member states[2] which were surveyed mostly in 2010 and 2011 (HFCN, 2013a). In this paper we use the UDB 1.1 version (February 2015 release) of the HFCS data for 6 countries: Belgium, Finland, France, Germany, Italy and Spain. An overview of their data reference periods is provided in Table 1.

Table 1: Overview of reference periods

Country	Wealth	Income	Fieldwork
Belgium	Time of interview	2009	04/10 – 10/10
Finland	31/12/2009	2009	01/10 – 05/10
France	Time of interview	2009	10/09 – 02/10
Germany	Time of interview	2009	09/10 – 07/11
Italy	31/12/2010	2010	01/11 – 08/11
Spain	Time of interview	2007	11/08 – 07/09

Source: HFCN, 2013a, p.74

[2] Ireland and Estonia are not included, but joined in the second wave (fieldwork period is 2014). Moreover, Latvia, who joined the Euro zone on the 1st of January 2014, has also carried out the survey for the second wave.

The selection of countries was made such that it provides a good representation of different tax-benefit systems and types of existing wealth taxation. These 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. In addition, the sample sizes of these countries are among the highest in the HFCS. Moreover, the quality and reliability of the HFCS data is not clear yet for all countries. For Belgium an extensive validation of the HFCS data against external data sources such as EU-SILC and SHARE indicates that the HFCS is sufficiently reliable for the study of income and wealth in Belgium (Kuypers, Marx & Verbist, 2015). The HFCS surveys of Spain, France, Finland and Italy are adapted from prior existing surveys covering wealth information and hence the strengths and weaknesses of these data are relatively well-known. For Finland it is important to note that the HFCS information was gathered using register data; there was no separate data collection through interviews. The register data draw on the sample from Statistics Finland's income and living conditions survey (i.e. the Finnish EU-SILC). Information that cannot be taken directly from registers is estimated using various methods (see HFCN, 2013c for more information).

The HFCS dataset contains some very interesting features. First, the very wealthy are oversampled such that a better coverage of the top of the income and wealth distributions is obtained. 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). Hence, in contrast to EU-SILC which should represent the entire income distribution and is used to identify poor households, the HFCS focusses on the top of the distribution (HFCN, 2013a, p.98-99). Kennickell (2008) and Bover (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. However, Vermeulen (2014) shows that despite the oversampling strategy wealth shares of the top 5 and 1% are still underestimated. It is not clear whether this is also the case for the income distribution. Table 2 shows for each of our 6 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 4 per cent more of the top 10% wealthiest households compared to their share in the population.

Table 2: Overview of oversampling criteria and effective oversampling rates of the wealthy

Country	Oversampling top 10%	Oversampling top 5%	Oversampling criteria
Belgium	47 per cent	60 per cent	Average regional income
Finland	68 per cent	85 per cent	Individual income and socio-economic status from population register
France	129 per cent	208 per cent	Wealth
Germany	117 per cent	148 per cent	Taxable income of municipalities or street sections in large municipalities
Italy	4 per cent	0 per cent	No oversampling
Spain	192 per cent	314 per cent	Taxable wealth of individuals

Notes: "Effective oversampling rate of the top 10%: (S90 – 0.1)/0.1, where S90 is the share of sample households in the wealthiest 10%. Effective oversampling rate of the top 5%": (S95 – 0.05)/0.05, where S95 is the share of sample households in the wealthiest 5%. Wealthiest households are defined as having higher net wealth than 90% (95%) of all households, calculated from weighted data" (HFCN, 2013a, p.38).
Source: HFCN, 2013a, p.36-38

As EUROMOD requires no missing information, a second interesting feature of the HFCS data is that a multiple imputation technique was used to deal with selective item non-response (in the form of five different imputations). Exceptions are Italy where the level of item non-response was very low and only a single imputation was carried out and Finland which has negligible missing information because register data are used. In other words, crucial income and wealth information does not need to be imputed by researchers in the process of building the database. This imputation is not standardly performed in EU-SILC, implying that the researcher has to make decisions. Moreover, five different imputations lead to more accurate outcomes than a single imputation. The number of covariates used for the imputation, however, largely differs between countries as well as by income or asset type. Furthermore, the concrete variables that are used for these imputations are not documented. Therefore, the quality of imputations for individual countries may be hard to evaluate (Tiefensee & Grabka, 2014).

3 Construction of a standard EUROMOD input dataset based on the HFCS

In order to exploit the cross-country dimension of the HFCS data, it is quite natural to build a database from the HFCS for EUROMOD, the EU-wide tax-benefit model, rather than for separate national tax-benefit models. EUROMOD simulates cash benefit entitlements and direct tax and social insurance contribution liabilities on the basis of the tax-benefit rules in place and information available in the underlying datasets for all EU countries. Instruments which are not simulated (mainly contributory pensions), as well as market income, are taken directly from the data (Sutherland and Figari, 2013). As such, EUROMOD is of value in terms of assessing the first order effects of tax-benefit policies and in understanding how policy reforms may affect income distribution, work incentives and government budgets in the short term. Currently EUROMOD runs on EU-SILC data, but it is built in a way that maximises its flexibility and possibility to simulate tax-benefit policies on different databases.

There are two possible approaches for creating a EUROMOD input database that includes detailed information on assets, debt and income from wealth. The first option involves creating a EUROMOD input database directly from the HFCS dataset. For this the cumbersome and time consuming procedures currently used for building the EU-SILC input database can be adopted. More specifically, the necessary do-files can be adapted to the relevant HFCS concepts and variables. The second one involves matching information from the HFCS dataset with the current EUROMOD dataset based on EU-SILC. Such "statistical matching (also known as data fusion, data merging or synthetic matching) is a model-based approach for providing joint statistical information based on variables and indicators collected through two or more sources." (Leulescu & Agafitei, 2013, p. 7). We choose the first option, in order to maintain some important strengths of the HFCS, which would be lost if the second option were taken, notably the oversampling of the top of the distribution and the multiple imputation.

In order to be integrated in EUROMOD, a database needs to fulfil a set of basic requirements listed in Figari et al. (2007). Most of these requirements are met by the HFCS data. Indeed, the HFCS is a recent, representative sample of households in all countries[3]. Moreover, the income components covered in the HFCS are largely the same as those in EU-SILC, as well as socio-demographic characteristics and most other information affecting tax liability or benefit entitlement (Kuypers, Figari & Verbist, 2015). Hence, for the transformation of the HFCS data into a EUROMOD input database we have started from the same programming codes as the ones that have been used for the standard EU-SILC input dataset. In order to use the advantage of the multiple imputation to its fullest potential we have created five different HFCS input databases, each one of them representing information on one of the imputations. Afterwards each of these five data files is run through EUROMOD separately. Below we discuss some more detailed aspects of how in practice the HFCS has been transformed into a EUROMOD input database.

Sample

Table 3 presents an overview of the sample size and weights for the six selected HFCS countries. Following common EUROMOD conventions, children that were born after the end of the income reference period are deleted from the sample in the input database. In the HFCS we only know the age of the individual at the time of the interview, not the year in which they were born. We assume all individuals aged 0 years to be born after the income reference period. Applying this procedure, for example, to the German HFCS data results in a sample of 8,117 individuals, compared to the original 8,134 individuals. The number of households remains the same.

Table 3: Overview of descriptive statistics EM-HFCS and EM-SILC samples for six selected countries

Country	Database	Households	Original individuals	Restricted individuals	Mean weight
Belgium	EM-HFCS	2,327	5,506	5,488	1,961.1
	EM-SILC	6,132	14,754	14,700	727.1
Finland	EM-HFCS	10,989	27,009	27,009	195.2
	EM-SILC	10,989	27,009	27,009	195.2
France	EM-HFCS	15,006	35,729	35,375	1,742.4
	EM-SILC	11,044	26,531	26,387	2,295.8
Germany	EM-HFCS	3,565	8,134	8,117	9,966.8
	EM-SILC	13,079	27,978	27,906	2,888.7
Italy	EM-HFCS	7,951	19,836	19,736	3,032.6
	EM-SILC	19,147	47,551	47,420	1,265.8
Spain	EM-HFCS	6,197	15,850	15,772	2,868.3
	EM-SILC	13,014	35,970	35,858	1,253.7

Source: Own calculations based on HFCS and EU-SILC.

[3] Except for the sample of Slovenia which is only representative at the euro area level, but not at the country level (HFCN, 2013a).

Adjustments of variables

Because we have started from the same programming codes as the ones that have been used for the standard EU-SILC input dataset, the same variables are constructed with the same content. Also the adjustments and imputations are carried out in a similar way. For example, apart from certain variables, EUROMOD requires that input variables are covered at the individual level. Both in HFCS and EU-SILC several aspects are surveyed at the household level, such as property income, income from financial investments and income from social transfers. Similarly to EU-SILC these variables have been shared equally between the household head and his/her partner. However, there are other variables that require different or additional imputations when constructed based on the HFCS. For example, one of the largest differences between the two surveys is that EU-SILC reports the receipt of all types of social benefits in a very detailed manner, which is required for the EUROMOD input database. In the original HFCS dataset, in contrast, income from regular social transfers (except pensions and unemployment benefits) is covered under one aggregated variable. This variable is surveyed at the household level but can in principle comprise benefits received both by individuals or households. In light of this issue we have decided to include in the EUROMOD input database a variable ‘Benefit: other’ (bot) set equal to the original HFCS aggregate benefits variable. Then, we simulate in EUROMOD those benefits that can be accurately simulated based on other available information, after which these simulated values are subtracted from the aggregate variable. The residual variable should then in theory comprise all other types of country-specific benefits. When the simulated benefits turn out to be larger than the observed amounts, we only use the simulated amounts and set the residual benefits variable to zero. A more extensive overview of how the EUROMOD variables are derived based on the original HFCS variables can be found in Kuypers, Figari & Verbist (2015) and Kuypers et al. (2016).

Missing regional information

Unfortunately the HFCS UDB data do not include information on the region of residence of households. This means that regional specific policies cannot be accurately simulated in EUROMOD when using the HFCS as underlying input database. This affects all countries under consideration, but mainly Belgium, Italy and Spain have important regionalised tax and benefit policies. In the case of Belgium we use a more or less representative region. Specifically, we assume all households to live in Flanders as this is the region with the largest population share; hence, the impact on our results should be as small as possible. Among the existing simulations this mainly affects regional surtaxes in the personal income and property tax and the Flemish Care Insurance Contribution. In the case of Italy we simulate the regional income surtax based on the national tax rate (i.e. 1.23%) which is increased by the majority of regions, resulting in an underestimation of the total revenue. In the Spanish system all policies which are determined by the Autonomous communities are switched off in EUROMOD because it has much more regions than the other countries and differences in tax and benefit legislations tend to be large, such that there does not seem to be a truly ‘representative region’. In particular, it concerns the simulation of the regional income tax credits and the regional child benefits.

4 Simulating net incomes using the HFCS data

In this part we discuss the outcomes from the EUROMOD process based on the HFCS data (labelled EM-HFCS). In order to validate these results we compare them to those obtained by the EU-SILC database (labelled EM-SILC). Each time the HFCS and EU-SILC are compared for the same reference period, namely 2009 for Belgium, Finland, France and Germany, 2007 for Spain and 2011 for Italy. The results for EM-HFCS are obtained by taking the mean over the five imputations. Interesting to note is that the socio-demographic structure of the two databases is largely similar and also compares well to figures of external sources (see Kuypers, Figari & Verbist, 2015). Below, we assess the comparability of some main EUROMOD income concepts between EM-HFCS and EM-SILC. All variables are converted into yearly incomes, summed at the household level and equivalised according to the OECD-modified scale[4]. The presented values are the weighted values.

Table 4 provides a comparison of different inequality indicators between EM-HFCS and EM-SILC for the six countries. Overall, median and mean incomes are very similar in the two surveys, although the results for France diverge slightly more. For Belgium, Germany and Spain the relative difference between median and mean income is considerably larger for EM-HFCS than for EM-SILC, which implies a more unequal distribution in EM-HFCS. This is true for both original and disposable income, although the difference tends to diminish in disposable income. The results for the Gini coefficient support these findings. In contrast, in France and Italy the gap between median and mean income is larger in EM-SILC than in EM-HFCS, but Gini's are still larger for EM-HFCS in the case of France. For Finland the results are very similar, which is not surprising as the two surveys are composed of the same sample of households.

However, comparing these summary statistics is not enough to assess comparability, we should look at their full distribution. In Kuypers, Figari and Verbist (2015) we show, for example, for Belgium that although the medians in EM-SILC and EM-HFCS are highly similar, there exist large differences at the top of the income distribution, which is the main cause of the much higher Gini coefficients in EM-HFCS. This is argued to be largely due to the oversampling of the wealthy in HFCS which increases precision of the estimates at the top (Bover, 2008; Kennickel, 2008). For a more detailed validation exercise of EM-HFCS against EM-SILC for all six countries, we refer to Kuypers et al. (2016). The large discrepancy at the top of the income distribution is also found in Germany and Spain, but not as extreme as for Belgium.

[4] The OECD equivalence scale is constructed by giving the first adult a weight 1, any additional individuals aged 14 years or over 0.5, while individuals younger than 14 count for 0.3.

Table 4: Comparison of main EUROMOD income concepts, HFCS vs. EU-SILC

	Belgium			Finland			France		
	EM-HFCS	EM-SILC	EM-HFCS/ EM-SILC (%)	EM-HFCS	EM-SILC	EM-HFCS/ EM-SILC (%)	EM-HFCS	EM-SILC	EM-HFCS/ EM-SILC (%)
Original & pension income									
Median	21,891	22,638	96.7%	24,696	24,677	100.0%	16,928	22,108	76.6%
Mean	28,987	25,247	114.8%	28,043	27,901	100.5%	19,830	26,299	75.4%
Gini	0.48	0.38	126.3%	0.36	0.35	102.9%	0.48	0.38	126.3%
Disposable income									
Median	18,847	19,067	98.8%	20,566	20,755	99.1%	16,358	19,731	82.9%
Mean	21,636	20,177	107.2%	22,541	22,701	99.3%	18,449	23,032	80.1%
Gini	0.32	0.23	139.1%	0.25	0.24	104.2%	0.34	0.30	113.3%
	Germany			**Italy**			**Spain**		
	EM-HFCS	**EM-SILC**	**EM-HFCS/ EM-SILC (%)**	**EM-HFCS**	**EM-SILC**	**EM-HFCS/ EM-SILC (%)**	**EM-HFCS**	**EM-SILC**	**EM-HFCS/ EM-SILC (%)**
Original & pension income									
Median	21,520	22,417	96.0%	16,853	17,632	95.6%	13,259	14,109	94.0%
Mean	27,483	26,659	103.1%	19,981	21,286	93.9%	16,877	16,416	102.8%
Gini	0.42	0.37	113.5%	0.37	0.39	94.9%	0.40	0.35	114.3%
Disposable income									
Median	17,940	18,081	99.2%	13,235	14,899	88.8%	12,543	12,980	96.6%
Mean	21,724	20,528	105.8%	15,269	16,906	90.3%	15,347	14,340	107.0%
Gini	0.30	0.27	111.1%	0.33	0.33	100.0%	0.36	0.29	124.1%

Notes: Original and disposable income are annual amounts equivalised using the modified OECD equivalence scale, all individuals considered. Wealth amounts are at household level, not equivalised. All figures are derived using sample weights.

Source: Own calculations based on EM-HFCS and EM-SILC.

5 Enhancing the scope of policy analysis

The largest added value from using the HFCS data as an underlying database for EUROMOD is that it covers much more detailed information on wealth issues. This allows the expansion of policy domains currently covered in EUROMOD with different types of wealth related policies: taxation of wealth and income from wealth, tax incentives for asset accumulation, asset means-testing in determining eligibility for social benefits, etc.

Table 5 presents an overview of the existing policies (in the HFCS reference year) in the 6 selected countries for which the simulations require some type of wealth information. A detailed description of the wealth taxes can be found in Ernst & Young (2014). For each country the second column states whether the policies that exist were are already simulated in EUROMOD (S), whether we have refined the existing simulation (R), added a new policy (A) or could not simulate it (N). Overall, most taxes and policies that exists are either already correctly simulated, are refined or added in EUROMOD. In Belgium and Italy property taxes were already simulated in EUROMOD, but only for main residences, with the HFCS data we can also include other real estate properties. Policies that cannot be simulated include the inheritance and gift tax in Italy and Finland, also the real estate transfer tax in Finland and the tax deduction for contributions to private pension funds in Germany. This is due to the fact that information on these topics is either not present in the HFCS for this country or is insufficiently detailed for the simulations in EUROMOD. In the case of Spain only the wealth test for 'Complementary benefit to non-contributory pensions due to housing rent' is refined. There are also several regional benefits which have a wealth test, but due to the lack of regional information in HFCS this is not included.

A detailed description of the implementation in EUROMOD of each of these refined or new policies is discussed in Kuypers et al. (2016). With regard to the refinements of already simulated policies we for example take into account different tax rates applicable to different types of financial income (i.e. interests, dividends, ...) by imputing these separate amounts using the stock variables available in the HFCS. Furthermore, we added to the simulation of personal income taxes the deduction for contributions to private pension funds in Belgium and Spain and the deduction for dividends in France and Spain. In other cases the refinements consisted of adding an additional eligibility criteria for which cannot be checked with the EU-SILC data. An example here is the tax credit for mortgage repayment in France. The tax credit is generally 20%, but increases to 40% in the first year of the mortgage. While this was originally granted randomly to all households with a head younger or equal to 45 years, in the EM-HFCS we have information on the year of mortgage to verify this requirement. Also those welfare benefits for which an asset-test is applied were refined with more detailed information on net wealth. New wealth policies were coded in EUROMOD in as much detail as is possible given some of the data constraints. Deductions, credits, exemptions and reduced rates are applied when the relevant information is available directly from the HFCS or can be sensibly imputed based on other HFCS variables. In several cases we have to assume that requirements for preferential taxation are fulfilled. For instance, inheritance and gift taxes often treat business assets in a preferential way under the condition that the business is continued after transfer for a certain number of years. Similarly, the main residence is often not taxed or taxed at a lower rate when transferred to spouse or children if it has been the main residence of the deceased already for a certain number of years. Since we cannot check for the past or future with the HFCS data we assume that these conditions are fulfilled.

The lack of regional information in the HFCS is also a problem for the new coded policies. As discussed above, we used a representative region for Belgium; we also apply this strategy to the new wealth related policies. In particular, it concerns the taxes on real estate transfers and gifts and inheritances. For France and Germany regional differences exist in the tax rates of the recurrent property taxes in both countries and also the real estate transfer tax in Germany. But since general tax rules are determined at the federal level and the differences in tax rates are relatively small, at least in the HFCS reference year, we coded in EUROMOD average regional tax rates. In the case of Spain the original regional policies were switched off in EUROMOD. Wealth taxes are typically also a competence of the local government. For the simulation of the recurrent real estate tax and real estate transfer tax we used an average tax rate. The simulation of the inheritance and gift tax is based on the legislation of Cataluña, which appears to be a more or less representative region both in terms of the tax system as in terms of the population share it represents. Finally, differences in the legislation of the net wealth tax were still reasonably small in 2007, such that we coded the national legislation in EUROMOD. In other words, for each separate policy we applied a strategy which appeared to be most appropriate. The Italian and Finnish wealth policies do not require regional information.

In many cases the simulations require the inclusion of new information in the input database. Therefore, we have created a list of new EUROMOD input variables using the traditional EUROMOD acronyms system. An overview of these variables is provided in the annex of Kuypers et al. (2016). Some assumptions regarding the variables on inheritances and gifts are particularly noteworthy. First, we have to assume that the amounts reported in the HFCS are gross. From the design of the survey it is not clear whether net or gross amounts are reported by respondents, but because this type of tax is typically levied a few months after the transfer is actually received it is argued that respondents remember and report the gross amount. Moreover, the HFCS covers all information on inheritances and gifts at the household level. This implies that the data do not include transfers made between members of the same household, like for instance between spouses. Also, if several members of the same household receive an inheritance/gift from the same donor they are considered jointly. Since in practice these should be taxed separately it is possible that we will overestimate the tax burden in the EUROMOD simulations. For the practical creation of the input variables the first inheritance/gift received in the policy year is assigned to the household head, if more than one is received in the policy year these are assigned to other members of the household.

The French and Spanish net wealth taxes require information on net wealth during the policy year, while HFCS reports it at the moment of interview. In order to approximate net wealth at the time the tax would have been applicable we subtract from net wealth observed at the time of interview all real estate, inheritances and gifts purchased/received throughout the policy and survey year and financial income as an approximation of the growth of financial assets throughout the relevant year.

Furthermore, we need information on cadastral values for the simulation of property taxes in all countries, both for main residence and other real estate property, and sometimes even more detailed variables. Unfortunately, this information is lacking in the HFCS. In order to solve this issue we have considered several strategies. Since cadastral values depend largely on the characteristics of the real estate, we considered to apply a regression. Unfortunately, the HFCS does not cover sufficient information on building characteristics. In second instance, we searched for total cadastral values by country in administrative sources to be able to impute a ratio based on the total amount of market values in the HFCS. This strategy was also not satisfactory as these values in most countries also cover cadastral values of business and government owned real estate, while we have those of private households only in the HFCS.

For three countries in our selection we were able to come up with some sort of estimate of cadastral values. For Belgium we calculated the ratio between average cadastral income of the main residence in EM-SILC and the average market value of main residence in EM-HFCS and then applied this ratio to all real estate properties. In the case of Italy, cadastral values have been derived by applying a coefficient to market values such that the total aggregate value of cadastral values reported by administrative data is replicated. For Germany a ratio between cadastral and market values was estimated by a country expert based on a matched dataset of HFCS and EU-SILC (Paetzold & Tiefenbacher, 2016). Although it is well known that in reality there is no perfect match between market and cadastral value, because the latter are often outdated, this is the only method we can apply to date. For the other three countries (Finland, France, Spain) average cadastral values are not available. We have requested and awaiting information from national experts on the total tax base and tax revenue for private households only[5]. Therefore the results of the property taxes in these countries are not yet included in this draft paper.

Table 6 presents the comparison of the outcomes regarding tax revenues for our newly simulated wealth tax policies with external figures from the OECD Tax Revenues Database (2016). In general, given all the assumptions we had to make and the sometimes relatively low sample sizes, our simulations yield outcomes that are relatively satisfying compared to the official tax revenue statistics. However, for the inheritance and gift tax we often underestimate the tax revenue. (Part of) this might be explained by the fact that the HFCS does not observe inheritances and gifts made between members of the same household, while especially inheritances and gifts between spouses constitute a large share of the total amount of transfers. Moreover, at first sight we also appear to underestimate the revenues of the tax on real estate transfers. The figures of the OECD, however, can include also taxes on the transfer of financial property and taxes paid by businesses, while we only simulate taxes paid by individuals and solely on real estate property. Finally, the simulations of the net wealth taxes in France and Spain appear to considerably overestimate the actual revenues.

[5] We have also requested this information for Belgium, Italy and Germany, such that we can validate our estimates based on the ratio of market and cadastral values.

Table 5: Overview of existing wealth-related policies and their coverage in EUROMOD in the 6 selected countries, HFCS reference period

	Belgium		Finland		France		Germany		Italy		Spain	
Tax/policy	**Exist.**	**Cov. EM**	**Exist.**	**Cov. EM**	**Exist.**	**Cov. EM**	**Exist.**	**Cov. EM**	**Exist.**	**Cov. EM**	**Exist.**	**Cov. EM**
Inheritance tax/provision	Y	A	Y	N	Y	A	Y	A	Y	N	Y	A
Gift tax/provision	Y	A	Y	N	Y	A	Y	A	Y	N	Y	A
Real estate tax/provision	Y	R	Y	A	Y	A	Y	A	Y	S/R	Y	A
Real estate transfer tax/provision	Y	A	Y	N	Y	A	Y	A	Y	A	Y	A
General net wealth tax/provision	N		N		Y	A	N		N		Y	A
Specific net wealth tax	Y (*)	A	N		N		N		Y	A	N	
Taxation of income from financial assets	Y	R	Y	R	Y	R	Y	S	Y	S	Y	R
Taxation of rental income	Y	R	Y	S	Y	R	Y	S	Y	S	Y	R
Tax deduction for mortgage repayment	Y	R	Y	S	Y	R	Y	R	Y	S	Y	R
Tax deduction for contributions to private pension funds	Y	R	Y	S	Y	S	Y	N	Y	S	Y	R
Wealth test for social benefits	Y (**)	S	Y (***)	R	N		Y (****)	R	(N)		Y (*****)	R (N)

Notes: S=already simulated in EUROMOD and no refinements necessary, A=simulation added to EUROMOD, R=simulation refined, N=not simulated
(*) Taxation of long-term savings, (**) Income guarantee for the elderly, (***) Pensioner's housing allowance, (****) Unemployment benefit 2, Social assistance (normal & for elderly) and Education benefit, (*****) Wealth test for 'Complementary benefit to non-contributory pensions due to housing rent' is refined, wealth test of regional benefits cannot be simulated
Ernst & Young (2014) make a distinction between a tax and a provision in another non-wealth tax, such as the income tax. We do not make this distinction.
Source: Ernst & Young (2014)

Table 6: Validation tax revenues new implemented wealth tax policies

Country	Policy	Millions of Euro		EM-HFCS/External source (%)
		EM-HFCS	External source (*)	
Belgium	Real estate tax	1,709	2,981	57.3%
	Real estate transfer tax	1,708	2,820.1 (**)	60.6%
	Registration duties on mortgage creation	198.1	74.4	266.2%
	Inheritance tax	1,359	1,779.9	76.4%
	Gift tax	127.5	269.9	47.2%
	Tax on long-term saving	134.6	184.9	72.8%
Finland	Real estate tax		462	
France	Real estate tax		13,647	
	Real estate transfer tax	6,300	7,188 (**)	87.6%
	Inheritance & gift tax	5,303	7,357	72.1%
	Net wealth tax	5,883	3,580	164.3%
Germany	Real estate tax	6,282	4,374	143.6%
	Real estate transfer tax	3,728	4,857 (**)	76.8%
	Inheritance & gift tax	1,356	4,550	29.8%
Italy	Real estate tax	5,751	9,663 (***)	59.5%
Spain	Real estate tax		7,274	
	Real estate transfer tax	6,268	17,399 (**)	36.0%
	Inheritance & gift tax	3,242	2,905	111.6%
	Net wealth tax	3,858	2,059	187.3%

Notes: (*) OECD Tax Revenue Database (2016); (**) can also include registration duties on financial transactions and/or transactions by businesses; (***) includes the tax paid by firms on commercial properties and lands; recurrent real estate tax for Finland, France and Spain not yet included because there is not yet information available on cadastral values.
Source: Own calculations based on EM-HFCS and EM-SILC

Table 7 reports the redistributive effects of the simulated wealth tax policies comparing the Gini coefficient of disposable income (as usually produced by EUROMOD, without taking into account wealth related taxes and policies) and the Gini coefficient of disposable income minus wealth taxes. In Belgium, France and Spain the inequality level increases when we deduct the wealth taxes, while in Germany it is constant and in Italy it shows a small decrease.

Table 7: Gini index of disposable income before and after the inclusion of wealth related taxes

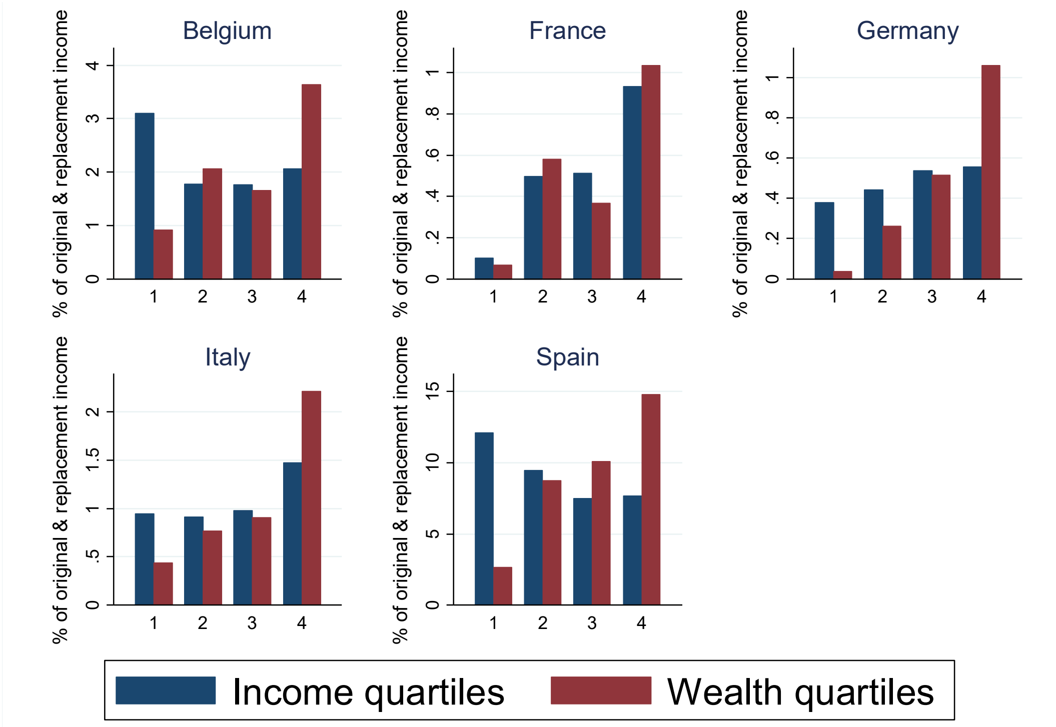
Country	Disposable income	Disposable income minus wealth related taxes
Belgium	0.3403	0.3555
France	0.2806	0.2840
Germany	0.2929	0.2929
Italy	0.3242	0.3218
Spain	0.3567	0.3784

Note: Recurrent real estate tax for Finland, France and Spain not yet included because there is not yet information available on cadastral values. Because this is the only tax we can include in the Finnish EUROMOD, Finland is not yet included in this table.
Source: Own calculations based on EM-HFCS

The impact on inequality can be due to the design of the wealth related taxes but also to some (few) individuals who pay a large amount of tax who can be located at the bottom of the income distribution. In order to understand the incidence of the wealth taxes, Figure 1 shows the overall wealth tax rate (as % of original & replacement income, i.e. gross income) by income and wealth quartiles. Wealth related taxes appear to be progressive in France, Germany and Italy when considered against the income distribution but regressive in Belgium and Spain. In all countries they are progressive when considered against the distribution of wealth.

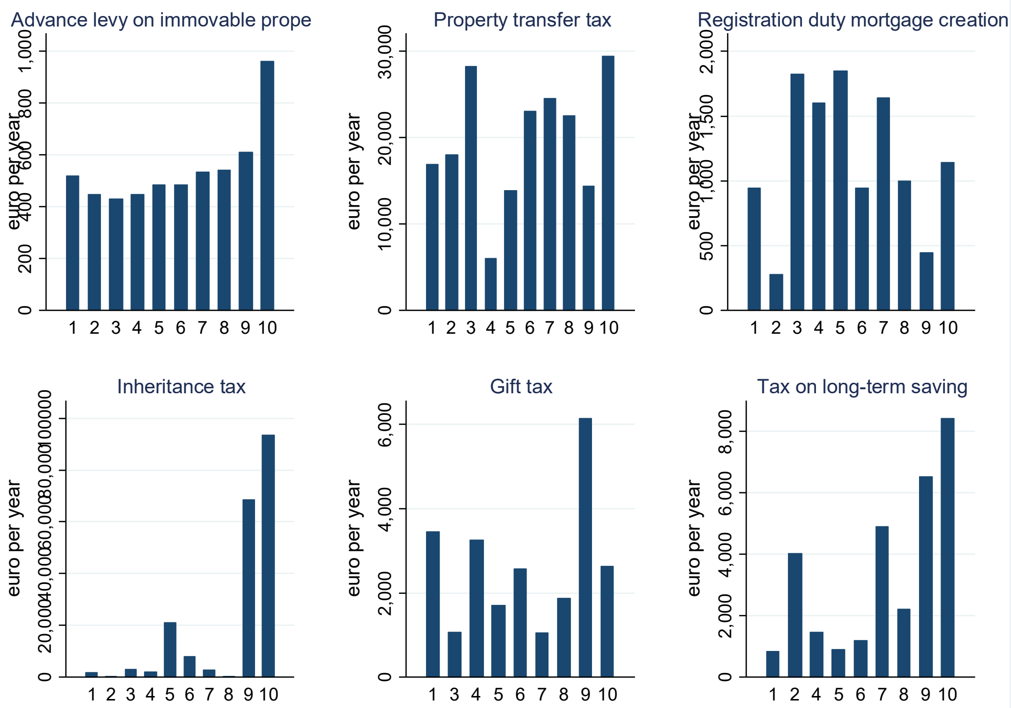
In order to understand which wealth taxes have a major impact on the income distribution, Figure 2 to Figure 6 shows the average amount per year of wealth taxes by income deciles. The figures are based only on households with positive amount of taxes paid, whose numbers are provided in the notes of each Figure.

Figure 1: Wealth taxes as % of original & replacement income by income and wealth quartiles



Note: Recurrent real estate tax for Finland, France and Spain not yet included because there is not yet information available on cadastral values. Because this is the only tax we can include in the Finnish EUROMOD, Finland is not yet included in this figure.
Source: Own calculations based on EM-HFCS

Figure 2: Wealth taxes, euro per month, by income deciles - Belgium

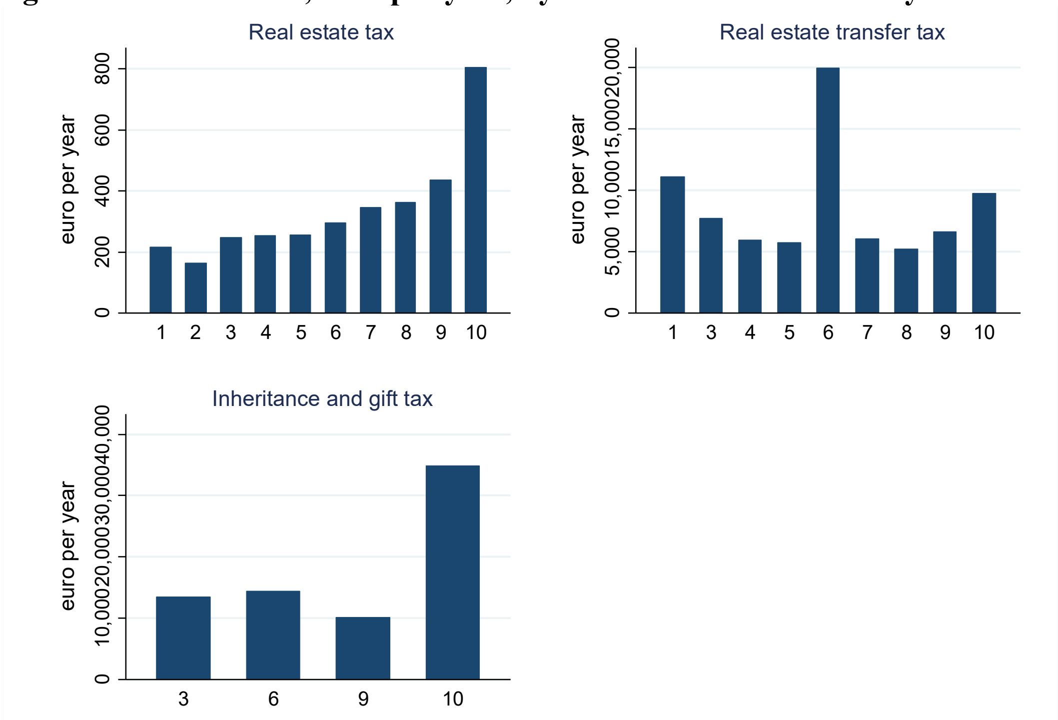


Notes: only households with positive amount of taxes paid included in the graphs. Unweighted observations (n): Advance levy on immovable properties: 1,786, Property transfer tax: 33, Registration duty mortgage creation: 65, Inheritance tax: 37, Gift tax: 32, Tax on long-term saving: 28

Figure 3: Wealth taxes, euro per year, by income deciles – France

Notes: only households with positive amount of taxes paid included in the graphs. Unweighted observations: Real estate transfer tax: 366, Inheritance and gift tax: 104, Net wealth tax: 1,699; Recurrent real estate tax not yet included because there is not yet information available on cadastral values.

Figure 4: Wealth taxes, euro per year, by income deciles – Germany



Notes: only households with positive amount of taxes paid included in the graphs. Unweighted observations: Real estate tax: 2,343, Real estate transfer tax: 67, Inheritance and gift tax: 12

Figure 5: Wealth taxes, euro per year, by income deciles – Italy

Notes: only households with positive amount of taxes paid included in the graphs. Unweighted observations: Real estate tax: 1,933, Net wealth tax : 7,951

Figure 6: Wealth taxes, euro per year, by income deciles – Spain

Notes: only households with positive amount of taxes paid included in the graphs. Unweighted observations: Real estate tax: 5,642, Real estate transfer tax: 121, Inheritance and gift tax: 86; Recurrent real estate tax not yet included because there is not yet information available on cadastral values.

6 Illustrative research possibilities

The availability of disposable income derived running EUROMOD on the HFCS data allows us to assess jointly the distribution of disposable income and net wealth for the six countries included in this paper. The extension of simulated policies in EUROMOD opens up new possibilities in policy research. We provide an illustration of possible analysis for both aspects.

6.1 Joint income-wealth distribution

First, we consider the joint distribution of income and wealth according to quartiles. This may help to shed light to what extent income and wealth inequalities are jointly determined and interact with one another (see also OECD 2015 for an example of the United States). Figure 7 shows the distribution according to income and wealth quartile for the two countries. In the case of a perfect correlation, the options '11', '22', '33' and '44' should correspond to 25% each. This is, however, not the case, showing that there is considerable reranking of individuals if one would move from one distribution to the other. For instance, in all countries less than 15% of individuals of the first income quantile are located in the bottom wealth quantile; a similar pattern is found for the top quartile.

Figure 7: Joint distribution of disposable income and net wealth

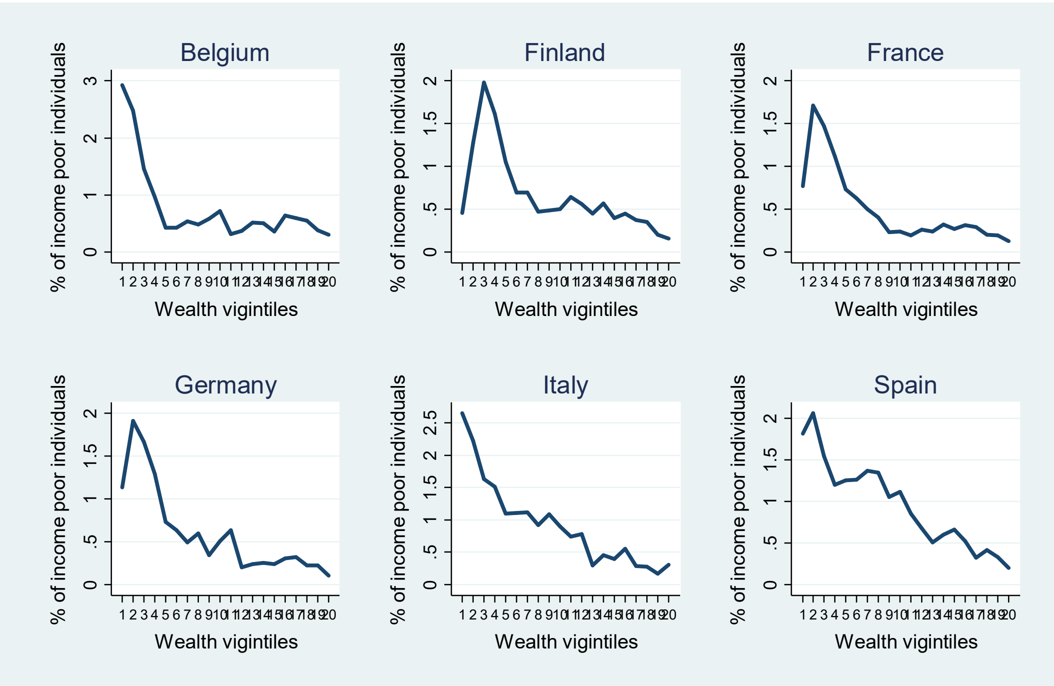
Source: own calculations

Nevertheless, the correlation between disposable income and net wealth at household level is positive (0.22 in Belgium, 0.23 in Spain, 0.38 in Germany, 0.48 in Italy, 0.55 in France and

0.63 in Finland), as one would expect given that higher wealth in general generates higher capital income. But given that the correlation is far from perfect, these outcomes illustrate that apart from income there are other drivers of wealth inequality that play an important role (e.g. gifts, inheritances, capital gains, …; see also Piketty, 2014).

The newly developed database may also help to tackle challenging issues such as those faced by 'asset rich/income poor' households (Hills, 2013). Given that we have calculated disposable income, we are now able to identify income poor households and link this with their wealth situation. Figure 8 shows the share of those in income poverty (i.e. equivalent disposable income below 60% of the median) across the wealth distribution. If the income and wealth distributions corresponded we would find the income poor individuals (around 20% of individuals across countries) only up to the fourth wealth vigintile. As expected, we find that the highest share of poor people is found in the bottom of the wealth distribution. Nevertheless, income poor people are also found higher up the wealth distribution. Moreover, in some countries (in particular, Finland, France and Germany) those in the first wealth vigintile(s) are not experiencing the highest income poverty risk, confirming the potential temporary volatility of income.

Figure 8: Share of income poor across the wealth distribution



Source: own calculations

6.2 Microsimulation of hypothetical wealth taxes and distributional analysis of their impact

EUROMOD running on HFCS data allows us to explore the effects of hypothetical wealth taxes across the countries included in the paper. The enhanced policy scope of EUROMOD, which now includes taxes (and social insurance contributions) on income, taxes on wealth and benefits, can be exploited to analyse the redistributive, budgetary and work incentive consequences of changes to wealth related taxes, with a special focus on revenue-neutral policy reforms aimed at shifting the tax burden from labour taxation to wealth taxation. In other words, wealth tax reforms (affecting either real or financial assets) can be accompanied by further changes to non-wealth-related components of the tax-benefit system potentially enhancing labour supply incentives (i.e. a reduction of tax burden on low earners). For the simulation of alternative wealth taxes, the focus can be on real and financial assets to reflect non cash components that still enhance potential consumption due to their monetary return.

The simulations can focus on the budgetary effects of the hypothetical reforms in order to highlight the amount of differential fiscal revenues entailed. On the one hand, additional fiscal revenues entailed by non-revenue-neutral tax reforms could be of great interest to several European countries currently facing severe fiscal imbalances. On the other hand though, revenue neutral tax reforms capable of shifting the burden away from labour to wealth (e.g. providing an extra tax relief in the form of a tax deduction or a tax credit to labour earnings) represent an appealing route for enhancing economic growth and fostering employment.

7 Conclusion

Given increased levels of inequality in many Western countries, there are strong arguments nowadays for broadening the existing tax bases to include wealth and income from wealth. These arguments relate both to horizontal and vertical equity reasons, as well as to efficiency considerations, as wealth taxes minimise economic distortions by taxing fixed factors. In this paper we have presented a research tool to enhance the empirical analysis at the micro level of such wealth taxes. By integrating the Eurosystem Household Finance and Consumption Survey dataset as an underlying database in the tax-benefit model EUROMOD, we allow for many new empirical research possibilities, both for national studies on the six countries (Belgium, Finland, France, Germany, Italy and Spain) for which the integration has been done, as well as for international comparative purposes. We have presented some illustrations in the paper of these new possibilities. We have shown that it is now much more straightforward to analyse the joint distribution of disposable income and net wealth as we use information from the same survey. Moreover, it also allows to tackle challenging issues such as those faced by 'asset rich/income poor' households by enabling an integrated assessment of direct taxes on both income and wealth. By expanding EUROMOD with the policy domains currently simulated in EUROMOD with dimensions like wealth taxation and asset building incentives, it is now also possible to investigate distributive, work incentive and budgetary consequences of taxes levied on real estate, net wealth, inheritances and gifts, etc. Furthermore, policies which encourage asset accumulation, such as tax deductions for mortgage interest repayment or for contributions made to private pension funds, can also be analysed. Not only will it be possible to study existing policies, but we are also able to estimate the impact of (potential) reforms, also in interaction with other tax-benefit policies. Moreover, with new waves of HFCS becoming available in the near future, the scope for analyses over time will be enhanced.

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