Size and distributional pattern of pension-related tax expenditures in European countries

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Abstract

Policy discussions on pension systems generally focus on their sustainability and design, including retirement age, income reference and contributory period, with relatively little attention devoted to the tax treatment of pension contributions and pension benefits. However, tax expenditures—defined as deviations from an agreed benchmark tax system—are widely used in EU Member States, and little is known about their fiscal and distributional impact. This paper quantifies the fiscal and distributional impact of tax expenditures related to public and private contributory pension schemes, affecting both contributions and pension benefits, in 28 European countries using EUROMOD, the EU-wide microsimulation model. We find that pension-related tax expenditures can have a sizeable impact on revenue and strong effects on inequality and poverty. Tax expenditures tend to be progressive on two levels: first, among pensioners, by favoring those with lower incomes, mainly as a result of the preferential treatment given to pension incomes; and, second, among people of working age, through a partial or no deduction of pension contributions, draining resources from those at the top of the income distribution. Moreover, embracing a lifetime perspective, tax expenditures tend to redistribute resources in favor of women and low educated individuals.

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1. INTRODUCTION

Tax expenditures are usually defined as “exceptional tax treatments with respect to a generally agreed benchmark tax system” (Burton & Sadiq, 2013). Such a generalization is deliberate because a specific feature of tax expenditures is that they can be “positive” in the sense that they represent a reduction in tax liability or “negative” in the sense that they increase the tax burden. Although recent EU legislative measures have recognized the relevance of accounting for and measuring the impact of tax expenditures, there is a notable difference in EU Member States’ practices, including their methods, details and timeliness (Kalyva et al., 2014), making a cross-country comparison of the size and redistributive effects of tax expenditures, based on nationally provided information, extremely complex, if not impossible.

Notwithstanding the conceptual and measurement issues, there is general agreement that in many EU Member States tax expenditures constitute a non-negligible proportion of gross domestic product (GDP) (OECD, 2003, 2010; Kalyva et al., 2014; Barrios et al., 2016; Avram, 2017), as in the U.S. (Toder, 2000; Burman, Geissler, & Toder, 2008). In particular, it is widely recognized that pension systems are generally subject to favorable tax treatment (OECD, 2015, 2016), and pension-related tax expenditures, together with tax expenditures related to health and housing, can potentially generate significant redistributive and long-term effects on the sustainability of public finances.

However, pension-related tax expenditures have received limited attention in public debates about pension reforms, as well as in the academic literature. In practice, governments rarely consider reforms affecting pension-related tax expenditures. Pension reforms generally focus on designing pension systems and deal with aspects such as retirement age, coverage, reference income and/or contribution periods. An obvious reason for this is that tax reforms affecting working-age individuals and pensioners bear an immediate political cost even though they have the

potential to lead to long-term (and politically less attractive) economic gains (Feher & Jousten, 2018). The existing literature on pension systems has generally overlooked pension-related tax expenditures, not least because of the difficulty of measuring them and the relative "invisibility" of tax expenditures in the budgetary process. However, pension-related tax expenditures can be considered a *soft* redistribution device compared with direct income support (Stebbing & Spies-Butcher, 2010), which makes them a politically desirable alternative to public spending programs, with both taxes and public spending seemingly lower (Burman & Phaup, 2012). Recently, a number of national studies have advocated striking a better balance between the redistributive properties of existing pension-related tax expenditures and their fiscal cost; see, for instance, Armstrong, Davis & Ebell (2015) for an analysis of the UK case, Caminada & Goudswaard (2008) for the Netherlands and Toder (2009) for the U.S.

In this paper, we aim to fill the existing gap in the literature and policy debate by analyzing the fiscal and redistributive implications of existing pension-related tax expenditures in all EU Member States, providing the first study across such a large number of countries. Our analysis integrates pension-related tax expenditures *within* the tax-benefit system using EUROMOD, the tax-benefit microsimulation model for the EU (Sutherland and Figari, 2013), to analyze both their fiscal and their redistributive impact. A distinctive feature of EUROMOD is that it compares all taxes and social benefits across countries, which allows us to define a common benchmark and to conduct a cross-country comparison of pension-related tax expenditures, creating a stronger base for generalizing the results. The empirical contributions are twofold. First, we discuss the fiscal effects of pension-related tax expenditures and the redistributive patterns observed across individuals in each country

in 2017, our reference year. Second, we provide a quantification of the life-cycle dimension by adopting an approach derived from the generational accounting literature (Ter Rele, 2016).

One clear advantage of adopting a microsimulation approach (Figari, Paulus & Sutherland, 2015) in this respect is that the definition of the benchmark system against which tax expenditures can be measured is made transparent. We define counterfactual simulation scenarios that remove the existing "exceptional tax treatments" and allow us to define the benchmark system. The tax expenditures are then quantified as differences in either tax revenue or individuals' disposable income between the tax-benefit system actually in place and the benchmark system. We focus on the second pillar (mainly mandatory occupational schemes) and third pillar (mainly voluntary schemes) of the pension systems—as defined in the Organisation for Economic Co-operation and Development (OECD) taxonomy (OECD, 2015)—and we analyze the tax expenditures related to both the contributions and the pension benefits of each pillar. For each country, we define four counterfactual scenarios for contributions paid and pension benefits received related to the second and third pillars.

In this paper, we adopt a benchmark system in which pension contributions and revenue accruals are exempt and taxes apply when benefits are received. In the fiscal literature, this is known as the exempted-exempted-taxed (EET) benchmark, which refers to exemption treatment in the accumulation and investment phase and taxation treatment in the decumulation phase (Cremer & Pestieau, 2016). As clarified in the next, this benchmark is justified on normative grounds, as taxation affects consumption, which is generally considered a less distortive tax base than labor and capital income. The EET benchmark is also justified on practical grounds, as most EU countries follow this system or a variation of it. From a policy perspective, individuals are considered short-sighted in their saving habits, and they tend to under-invest for

retirement such that tax incentives in the accumulation and investment phases can also be considered necessary to ensure a minimum level of retirement income (Chetty et al., 2014).

In our empirical analysis, we have to ignore the investment phase, and our counterfactual scenarios boil down to an exemption treatment in the accumulation phase and a taxation treatment in the decumulation phase (i.e. throughout the paper we use the notation E-T to refer to the simulated counterfactual scenarios where the tax treatment of the investment phase is ignored). On the one hand, this methodological choice is forced by the lack of data on the investment phase in the underlying data of EUROMOD. On the other hand, most of the European public pension systems are pay-as-you-go (PAYG) funded. Interests on contributions are computed only notionally and the taxation applies only to the accumulation and decumulation phases (Feher & Jousten, 2018). Nevertheless, for completeness and transparency, in the appendix we also report empirical evidence of the fiscal effects of pension-related tax expenditures computed by means of counterfactual scenarios characterized by taxation treatment in the accumulation phase and exemption treatment in the decumulation phase. Such counterfactuals (defined with the notation T-E), while ignoring the investment phase, are the most appropriate for describing the size of pension-related tax expenditures with respect to the alternative income tax benchmark, known as the taxed-taxed-exempted (TTE) benchmark.

With respect to the EET benchmark, pension-related tax expenditures are mainly motivated by fiscal and equity reasons. On the one hand, a partial or null exemption of contributions from income tax, often driven by budgetary factors, is also justified by analogous or an even more constrained fiscal treatment of other saving opportunities. On the other hand, tax relief on pension benefits can be considered to some extent a substitute for the progressive withdrawal of governments from financing pensions and a way to support lower-income pensioners

(Cremer & Pestieau, 2016; Holzmann et al., 2009) and to spread income out over a lifetime thus preventing old-age poverty (Dilnot & Johnson, 1993).

As can be seen from the size and redistributive effects highlighted in our empirical analysis, the limited attention paid by the public to pension-related tax expenditures stands in clear contrast to their relevance. The evidence our paper provides can, in principle, offer four main reasons for redesigning both the pension and the fiscal benefit systems. First, an analysis of pension-related tax expenditures, including potential reforms to these, should be performed. In particular, the implications for net disposable incomes should be considered because pension-related tax expenditures might trigger important redistributive and fiscal effects in progressive tax systems. Second, current pension-related tax expenditures are sizeable and weigh on both short-term budgetary constraints and the long-term sustainability of public finances, which also indirectly affects the viability of pension systems. Third, pension-related tax expenditures resulting in relevant changes to disposable incomes might influence not only individuals' spending and savings (including pension contributions), but also their work and retirement decisions (Gruber & Wise, 2004). Thus, tax reliefs give a clear message to individuals, with indirect wider economic consequences for the long-term sustainability of pension systems. Fourth, pension-related tax expenditures act as a major redistributive mechanism from a life-cycle perspective, especially in cases where these tax rebates do not match future pension benefits, as is often likely to be the case (Feher & Jousten, 2018). In particular, current pension-related tax expenditures can be perceived as too generous if public services are expected to be financed by future rather than current tax payers, as in current PAYG systems. From these different perspectives, the use of the tax instrument, together with reforms affecting pension regimes, would be warranted in order to address the long-term sustainability of pension systems.

Moreover, our paper provides a methodological approach to estimating (ex ante) the impact of pension-related tax expenditures on household disposable income that can enhance the assessment of the fiscal structure parameters of macro models designed to analyze the macro-economic effects of pension reforms, defining scenarios that reflect the policy rules implemented in reality rather than using stylized scenarios that are often not plausible for a given country (e.g. Clinton et al., 2011).

The rest of the paper is structured as follows. In the next section, we present the main rationale for choosing EET as the benchmark system and the microsimulation model for the analysis that defined the simulation counterfactual scenarios. In the third section, we provide an overview of pension systems in EU Member States, focusing on current pension-related tax expenditures. In the fourth section, we report the empirical evidence on pension-related tax expenditures' revenue size, distribution pattern and fiscal impact over an individual's lifetime. The final section concludes.

2. BENCHMARK, METHODOLOGY AND DATA

2.1 The Tax Treatment of Pensions and the Benchmark for Tax Expenditures

Taxing pensions takes place at three possible times: i) when part of the income has been saved (*accumulation phase*), ii) when investment income and capital gains accrue (*investment phase*), and iii) when pension benefits are received (*decumulation phase*). Given these points at which it is possible to levy taxes, there are several basic tax combinations, but some are more common and characterize theoretical ideals for the tax system (see Whitehouse, 2005).

The most common system taxes both public and private pensions and follows the so-called EET approach (exempt worker contributions, exempt investment income and capital gains, and taxed benefits).[1] In the context of population ageing and the crisis of PAYG pension systems,[2] a favorable tax treatment for pension contributions is widely applied either by excluding pension contributions from the tax base used for calculating personal income tax or by granting a tax rebate on contributions to private pension investment plans. It is important to note that deducting the insurance contribution prevents the taxing of pension savings at two different points, and this is also adopted for public PAYG pension systems, even though the investment phase is particular as the return on savings is notional and generally equal to the growth rate of the economy. This approach, like the TEE (taxed contributions, exempt investment income and capital gains, and exempt benefits), is equivalent to a consumption or expenditure tax. When the personal income tax rate is flat, EET and TEE are equivalent in effect and are neutral between consumption now and in the future (Meade, 1978). Both confer a post-tax rate of return to saving equal to the pre-tax rate of return. They also deliver the same present value of revenues to the government, albeit with different timings (Auerbach, 2012): under EET—the "classical expenditure tax"—revenues are deferred until retirement, whereas under TEE—the "pre-paid expenditure tax"—they are collected immediately. The systems are not equivalent when personal income tax is progressive and marginal tax rates are different before and after retirement: an individual will benefit more from the EET scheme, which grants tax relief before retirement, when his or her marginal tax rate is generally higher, because earnings are higher than pension benefits.

[1] The motivation behind the tax exemption of an employer's contribution to an employee's pension fund is that it is not considered "income" in tax law, because the employee has no choice about to how to spend the contribution (Cremer & Pestieau, 2016).

[2] A PAYG system is a pension system in which state retirement benefits are financed by contributions levied from current workers, as opposed to a funded system in which contributions are invested to pay for future pension benefits.

Even if the EET and TEE approaches are formally equivalent, there are some arguments for preferring one model over the other. EET is often preferred when a person has insufficient information, is short-sighted about saving, underestimates their chances of living to an old age, any of which can lead an individual to favor immediate gratification over long-term planning and to under-invest in retirement. In these cases, upfront tax relief (EET) is perceived as more valuable (Chetty et al., 2014; Cremer & Pestieau, 2016). Nevertheless, it has been shown that the TEE model is risk-taking neutral, whereas the EET approach can affect risk-taking (Romaniuk, 2013; Chen et al., 2016). Armstrong et al. (2015), assessing the economic consequences of replacing the existing EET system in the UK with a TEE system, argue that progressive income taxation encourages earlier and greater savings under EET than under TEE. Moreover, the TEE system makes pension savings less attractive, as there is always the risk that future governments will take action to tax pension benefits (Feher & Jousten, 2018).

On practical grounds, most OECD countries follow the EET approach, namely the taxation of both public and private pensions (OECD, 2016) with exceptional tax treatments—i.e. tax expenditures against the EET benchmark—that take the form of partial or limited exemption of insurance contributions or tax relief, lower tax rates or the exemption of certain pension incomes.

The alternative approaches to pension taxation are TTE and ETT, when investment income and capital gains are also taxed. These systems correspond to a comprehensive income tax that is neutral between consumption and saving, but not neutral between consumption now and consumption in the future, implying a disincentive to save. Moreover, in TTE and ETT systems, inflation can increase the tax burden significantly when nominal returns are taxed.

Although the choice between positive or zero taxation of capital income is still disputed in the academic literature (see Banks & Diamond, 2010, and Hall, 2010), it is almost unanimously agreed that, in terms of efficiency and equity over an individual's life cycle, the consumption tax system (EET or TEE) remains the most appropriate model for taxing pension savings (see Booth & Cooper, 2002, and, more recently, Mirrlees et al., 2011).

2.2 The Measurement Approach to Tax Expenditures

As mentioned above, tax expenditures must be measured as exceptions to some benchmark or baseline tax system that serves as a point of comparison. In practice, identifying tax expenditures in official publications is highly controversial, as there is no standard way of knowing which provisions in a tax system are parts of the baseline or normative tax system and which are exceptions, meaning that certain tax provisions may be regarded as tax expenditures in some countries but not in others.

The main distinction (OECD, 2010) is between approaches that use a norm based on theoretical concepts of income (the so-called normative approach) and those that use a country's own tax laws as a basis to define the benchmark (the so-called legal approach), isolating differential or preferential treatment judged as tax expenditures (e.g. targeted provisions to address specific policy objectives). The former will be classified as tax expenditure elements that might otherwise be considered part of tax design.

When choosing the benchmark taxation system, we follow the normative approach, which is more appropriate for international comparisons and less contingent than the legal approach to subjective and country-specific judgments. We use the EET model as the normative benchmark,

justified by the economic considerations presented above, in relation to alternative normative models, as well as its widespread, albeit partial, use across European countries for the taxation of pensions. Moreover, in the experience of EU Member States, even when a national government follows the legal approach to measuring pension-related tax expenditures, it frequently uses the EET benchmark, because currently EET is the structural model used for taxing pensions.

To quantify the size of the tax expenditures against the benchmark scenario, the literature uses four alternative budgetary approaches (Swift, 2006). The first is the *revenue foregone approach*, which provides an ex post measure of the revenue lost from the presence of tax expenditures, absent any change in behavioral reaction from the tax payers. Alternatively, the *revenue gain approach* quantifies the increase in revenue that could be expected if a particular tax concession was to be removed. A third possible approach is the *revenue outlay method*, which estimates the pre-tax expenditure required to achieve the same after-tax benefit if a given tax expenditure were to be replaced by a corresponding public expenditure program. A fourth approach adopts an explicitly dynamic perspective by estimating the *present value of the tax savings* associated with the tax expenditure.

To analyze the budgetary and distributional impacts of pension-related tax expenditures, in this paper we adopt the revenue foregone approach, showing the revenue cost (and hence the increase in household disposable income) from the presence of a given tax expenditure defined as a departure from the EET benchmark. In some cases, the current tax provisions generate a net revenue gain when compared with the EET benchmark and configure themselves as negative tax expenditures, implying a loss in household disposable income.

Because of a lack of data, the fiscal treatment of accrued or realized investment incomes, which are mainly relevant for funded (private) pension systems and not for PAYG systems, is not considered in our empirical analysis. Consequently, in what follows, the EET benchmark boils down to counterfactual scenarios characterized by exempt contributions and taxed pension benefits (i.e. throughout the paper we use the notation E-T to refer to the simulated counterfactual scenarios where the tax treatment of the investment phase is ignored). As such, our empirical analysis focuses on the evidence of the size and distributional effects of the tax treatment of the first (accumulation) and third (decumulation) phases of a pension system.[3]

2.3 Microsimulation Approach, Model and Data

To carry out the empirical analysis, we use fiscal microsimulation techniques (Bourguignon & Spadaro, 2006; Figari, Paulus, & Sutherland, 2015) to define and construct simulated counterfactual scenarios coherent with the adopted benchmark system. The empirical results are then

[3] Choosing a different benchmark would lead to different conclusions. See, for example, Collins and Hughes (2016), who analyzed the case of Ireland, showing the revenue costs of the existing tax reliefs for superannuation contributions. In our analysis, we show that, using counterfactual scenarios characterized by exempted contributions and taxed pension benefits, the age-related limits on the deductibility of superannuation contributions count as a negative tax expenditure and imply a net revenue gain. For transparency, in the Table A3 in the appendix we also report empirical evidence of the fiscal effects of pension-related tax expenditures obtained when using counterfactuals characterized by taxed contributions and exempted pension benefits (i.e. counterfactuals T-E), which represent the most appropriate counterfactuals to describe the size of the pension-related tax expenditures with respect to an income tax benchmark.
Nevertheless, the numbers in Tables A2 and A3 allow us also to quantify the tax expenditures with respect to a "reference law" baseline (i.e. tax expenditures as deviations from the existing general tax rules without considering the issues related to double taxation of contributions and benefits). In particular, columns f and g of Table A3 provide a quantification of the revenue cost of the (partial or complete) deduction of contributions, while columns c and d of Table A2 provide a quantification of the revenue cost of the existing tax reliefs on pension benefits.

derived, comparing the baseline scenario (i.e. with tax expenditures as currently defined in the tax law) with the counterfactual scenarios (i.e. without tax expenditures).

A microsimulation approach, based on national representative micro data, provides a number of advantages over other methods, such as using nationally reported aggregate statistics, for comparing tax expenditures cross-country. First, one clear advantage of adopting a microsimulation approach in this respect is that the definition of the benchmark system against which tax expenditures can be measured is made transparent. Second, a microsimulation model embeds the interaction between different tax instruments and benefit entitlement, which is usually not considered in more aggregated approaches and can, in certain instances, greatly influence the final impact of tax reforms. Furthermore, the use of a tax-benefit model based on micro data rather than "model family" calculations for stylized households provides information on the effects of policy on the whole distribution of income (or other characteristics such as age or gender) taking into account the population heterogeneity rather than only for particular standardized cases. This feature differentiates our study from that of the OECD (2016), in which the special tax regime for private pensions was compared with the tax regime of a benchmark savings vehicle for the average individual.

However, the multicountry comparative perspective—and the related complexity of modelling the pension-related tax expenditures together with all other tax benefits—forces us to adopt a static analysis approach that overlooks second-round effects (Doerrenberg & Peichl, 2014). A number of considerations mitigate the potential disadvantages of this solution. In particular, the greatest part of pension-related tax expenditures adopted in EU Member States is in fact targeted at elderly people who cannot react by changing their labor supply, as they are prevented from doing so

by labor demand, normative constraints, and health and personal conditions. Consequently, we can reasonably conjecture that the second-round effects of tax expenditures, if they exist, are not very important.

Nevertheless, we exploit the flexibility of the microsimulation approach to extend the cross-sectional estimates over a lifetime, borrowing a methodology developed in the generational accounting literature and presented in the last section of the paper. Indeed, by assuming that the age profiles of pension-related tax expenditures by gender and education level remain constant across years, we can derive an estimate of their present value for low, medium and high educated men and women. Such an approach, although relying on simplifying assumptions, has the clear advantage of providing an indication of the fiscal impact of tax expenditures over an individual's lifetime.

The simulations we present were carried out using EUROMOD (Sutherland & Figari, 2013), which is the only comparative tax-benefit model available for all EU Member States. It has a unique design within which the different country-specific tax-benefit systems are modelled in a common conceptual and technical framework to maximize cross-country comparability. It also serves as the main or only national model in a number of EU Member States.

EUROMOD simulates (non-contributory) cash benefit entitlements and personal tax and social insurance contribution (SIC) liabilities on the basis of the tax-benefit rules in place and information on original and replacement incomes, as well as sociodemographic characteristics from the underlying survey data. The model captures the full range of institutional features of tax and benefit systems in EU countries. These include detailed income definitions (such as taxable income or "means" relevant for computing income-tested benefits), precise characterization of family and assessment units, thresholds, floors, ceilings and relevant tax rates, as well as specific eligibility rules, and claw-back rates or income

disregards used in computing benefit entitlements. Thanks to this considerable level of detail, it is possible to obtain a comprehensive picture of tax burdens and benefit entitlements, and of how these vary with earnings and individual or family characteristics.[4]

The base simulations refer to the mid-point of a given policy year (30 June). Tax-benefit policies are summarized in EUROMOD country reports, along with technical notes and validation results.[5] The base model provides estimates of the first-order impact of tax-benefit changes and is non-behavioral. Overall, comparing the simulated income distribution (with taxes and benefits simulated by EUROMOD) and the distribution reported in the survey and the validation of tax-benefit instruments against aggregate administrative data reveals a very good match. EUROMOD is publicly available and has been widely applied in academic research[6] and policy analysis,[7] representing a further layer of cross-checks and validation.

The version of EUROMOD used in this paper is based on personal and household characteristics (including market incomes) from the 2015 EU Statistics on Incomes and Living Conditions (EU-SILC) microdata (or, where available, its more detailed national version).[8] EU-SILC is a nationally representative annual household survey that collects detailed information on income, labor, education and health in all EU Member States and is harmonized by Eurostat. Since 2010, EU-SILC data have been used for monitoring levels of poverty and social inclusion in the EU.

[4] At the same time, because of a lack of detailed information in the underlying data, the EUROMOD simulations might not be able to capture all details embedded in the national tax legislation.
[5] See https://www.euromod.ac.uk/using-euromod/country-reports (retrieved March 15, 2018).
[6] For examples, see Immervoll et al. (2011), Dolls, Fuest, & Peichl (2012) and Bargain, Orsini, & Peichl (2014).
[7] Prime examples of the EU-level policy analysis with EUROMOD are its regular use for the Social Situation Monitor (retrieved March 15, 2018 from http://ec.europa.eu/social/main.jsp?catId=1049&) and increasing occurrence in annual country assessments as part of the European Semester (retrieved March 15, 2018, from http://ec.europa.eu/economy_finance/eu/index_en.htm). In addition, EUROMOD has been applied in numerous policy analyses at the national level.
[8] The microdata used for the UK come from the Family Resource Survey.

In this paper, we use 2015 data, with sample sizes ranging from about 10,000 to 11,000 people in Cyprus, Ireland and Malta to more than 50,000 thousand in the UK.

The simulations refer to the national tax and benefit rules as of 30 June 2017. To estimate the effect of tax expenditures, we apply both the actual 2017 tax-benefit policies and the counterfactual scenarios without tax expenditures to the same households, keeping their characteristics (including market incomes) constant. Owing to the gap between the data collection year and the reference time of our analysis, we adjust the input data to account for changes in the nominal level of market incomes by source, in line with actual changes since the income reference period. This allows us to isolate the policy effect from changes in other dimensions (e.g. demographics or labor market outcomes). Finally, where relevant, some calibrations are adopted to take into account tax evasion (in Greece and Italy) and non-take-up of certain means-tested benefits (in Estonia, Greece, Latvia, Romania and the UK), assuming behavior in this respect to be the same with and without tax expenditures.

3. PENSION SYSTEMS, TAX EXPENDITURES AND PENSION INCOMES IN EU COUNTRIES

The historical development of pension systems has led to complex systems across the EU, with large differences between countries. According to the widely accepted OECD taxonomy (OECD, 2015),[9] pension systems are organized into pillars and differentiated by the relative importance of these pillars. The first pillar is normally public and pays benefits that do not depend on the amount of contributions paid during an individual's working life. Its aim is to prevent poverty in old age, and its impact is highly redistributive. The second pillar, on the other hand, is

[9] Alternative taxonomies group pension schemes according to whether they are public or private, but these can be misleading in a cross-country analysis.

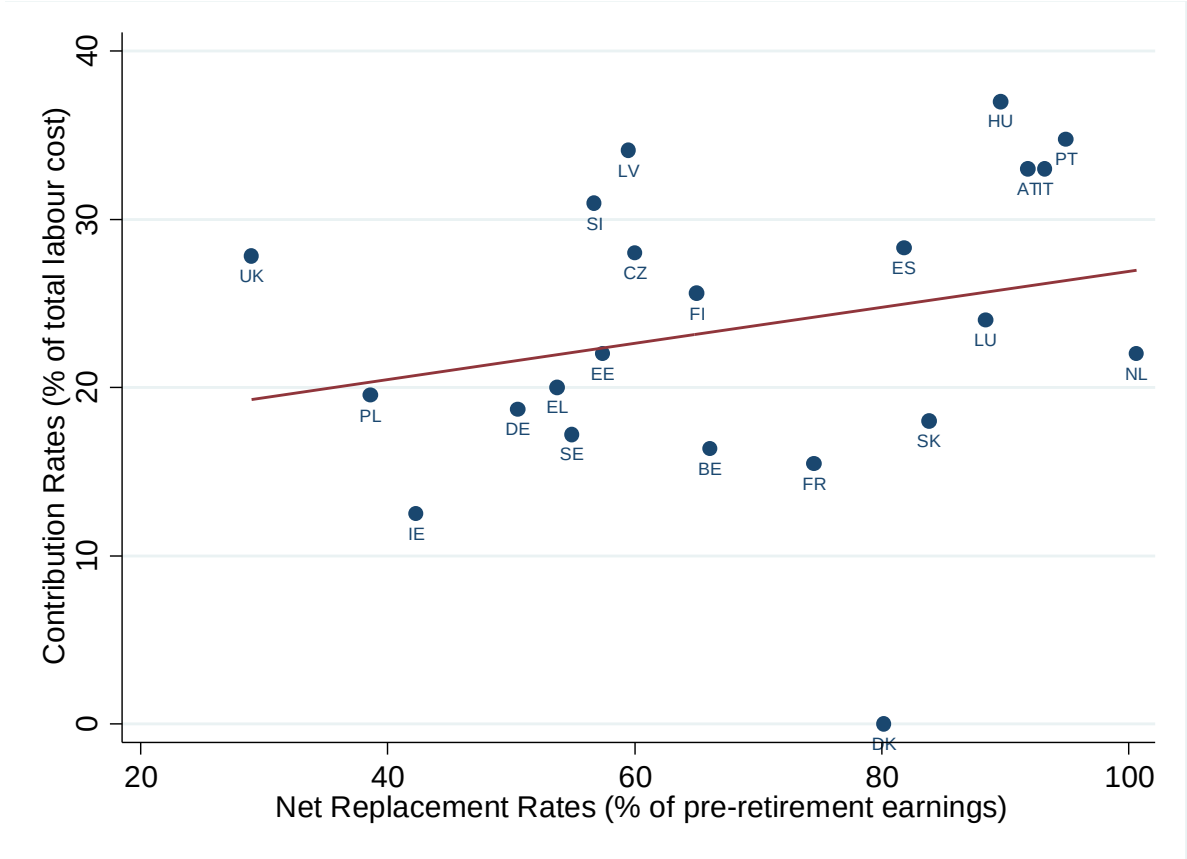
occupational, either public or private, pursues the maintenance of working-age living standards during retirement and makes up the great bulk of retirement support in most countries. In most cases, workers' contributions to the second pillar are mandatory. The third pillar is voluntary and tries to address individual preferences for retirement savings vs. alternative forms of savings.

The different pension schemes are one of the elements of the "ideal types of institutional structures" that Korpi and Palme (1998) identified in their welfare state typology. Focusing on old-age pensions and sickness benefits, their taxonomy (i.e. *targeted*, *voluntary-subsidized*, *corporatist*, *basic security* and *encompassing models*) is based on the institutional characteristics and the strategies of equality embodied in the different benefit schemes. The *targeted model* relies heavily on means testing and does not exist in its pure form in any European country. In many European countries, the voluntary-subsidized model was the precursor to the corporatist model inspired by Bismarck, in which social insurance is compulsory, although it is still organized along occupational lines. The basic security model resembles the original Beveridge design, with more comprehensive flat-rate benefits and low ceilings on earnings-related ones, on the assumption that higher-income groups will turn to the market and private insurance. Finally, the encompassing model combines ideas from Bismarck and Beveridge into a new pattern with generous citizenship-based universal *basic pensions* combined with earnings-related benefits for the economically active population.

To conceptualize the empirical analysis presented in the paper, the three relevant dimensions of pension systems are the contribution rates, the replacement rates[10] and the tax expenditures in the accumulation and decumulation phases.

[10] The replacement rate can be seen as a proxy of the size of the pension system usually expressed as a proportion of national GDP, as reported in the appendix, Table A4. It ranges from less than 5% in Ireland to more than 12% in Austria, Finland, France, Greece, Italy, Portugal and Sweden.

Figure 1 presents a scatter plot of the contribution rates and the net replacement rates related to old-age mandatory pension schemes. Overall contribution rates (i.e. those paid by employers and employees), expressed as a proportion of total labor costs, range from 0% in Denmark to 37% in Hungary. Most other countries show contribution rates of between 15% and 35%. The exception is Ireland, which has a lower contribution rate. The Netherlands has the highest net replacement rate, which is close to 100% of pre-retirement earnings. Austria, Hungary, Italy, Luxembourg and Portugal are above 88%, and Slovakia, Spain and Denmark are around or slightly above 80%. Most of other countries have rates between 50% and 75%. Finally, the UK, Poland and Ireland have lower replacement rates, ranging between 29% and 42%. Unsurprisingly, contributions are strictly correlated with net replacement rates, notwithstanding a substantial degree of heterogeneity.



Source: Contribution rates from EUROMOD country reports based on national legislation (https://www.euromod.ac.uk/using-euromod/country-reports/ retrieved February 5, 2018). Replacement rates from OECD, Pensions at a Glance 2017 (http://stats.oecd.org/ retrieved February 5, 2018). Information is missing for Croatia, Cyprus, Lithuania, Malta, Bulgaria, Romania and Latvia. Contribution rates are the sum of the rates paid by employers and employees and refer to mandatory old-age pension schemes only. The net replacement rate is defined as the individual net pension entitlement divided by net pre-retirement earnings, taking account of personal income taxes and social security contributions paid by workers and pensioners.

Figure 1. Contribution Rates and Net Replacement Rates in EU Countries, 2017

The observed dissimilarities originate from the specificities of each system and, in particular, from the differences in the demographic structure of the population, the pension rules, and the method of financing the pillars and the taxation regimes in place in each country, which strongly affect the net replacement rates.

In line with that observed for contribution and replacement rates, a high level of heterogeneity is found for the tax treatment of pension contributions and pension benefits. The most common system taxes both second and third pillar pensions coherently with the EET benchmark.[11] However, there are several exceptions and country-specific features that constitute pension-related tax expenditures,[12] particularly when social insurance contributions for pension schemes are taxed, fully or partially, or when pensions are exempted, fully or partially, by means of extra allowances and credits or reduced tax rates.

In fact, full exemption of social contributions and taxation of pension benefits are applied in only Denmark and Poland for the second pillar and in only the Netherlands and the UK for the third pillar. In all other countries, important exceptions and country-specific features in the tax treatment of pension incomes in both the accumulation and the decumulation phases, as shown in the appendix, Table A1, are treated as pension-related tax expenditures.

In 20 out of 28 countries, the contributions to the second pillar are exempted by means of full deduction from the taxable base of personal income tax. In Portugal and Sweden, the tax relief may exceed the value of a standard deduction because, in Portugal, contribution deductibility

[11] Overall, pensions from the first pillar are generally not subject to income tax or their amount is below the taxable level; for this reason, our empirical analysis ignores the fiscal treatment of pensions from the first pillar.

[12] Since 2013, a number of reforms to pension-related tax expenditures occurred, including abolishing tax relief on pension benefits (e.g. old-age asset allowance in the Netherlands, regional tax credit related to age in the Balearic Islands (Spain), seniority allowance in Slovenia and age allowance in the UK) and on contributions to third pillar schemes (e.g. tax relief abolished in Sweden and Slovakia).

is subject to a minimum threshold and, in Sweden, contributions are fully credited against tax liability. In other countries, the deductibility is limited in terms of either the amount (Germany and Ireland) or the category of pensions (the UK, where contributions to the state pension are not deducted). In three eastern European countries (Czech Republic, Lithuania and Hungary) contributions are fully taxed.

Pension benefits from the second pillar are fully taxed as part of the personal income tax in only Denmark and Poland, and in Greece they are subject to an extra tax in the form of a solidarity contribution. In 22 countries, pension benefits are subject to a lower degree of tax treatment in the form of tax allowance, tax credit or exempting some benefits for the income tax base. In three eastern European countries (Bulgaria, Lithuania and Slovakia), pension benefits are exempt from taxation. Notably, in Bulgaria and Slovakia contributions are also deducted so that pensions are not taxed in either the accumulation or the decumulation phase.

The fiscal treatment of the third pillar is even more varied with *contributions* fully exempt in only three countries (Latvia, the Netherlands and the UK) and partially deducted in 14 other countries. Contributions are fully taxed in Austria, Germany, Greece, Hungary, Malta, Poland, Portugal, Sweden and Slovakia.

With regard to third pillar pension benefits, in 16 countries these are regularly taxed as part of personal income tax; in Estonia, Greece and Italy they are subject to a lower tax rate; in Germany and Luxembourg they are partly exempt; and in Bulgaria, Croatia, Hungary Latvia and Portugal they are fully exempt from taxation.

As a consequence of such institutional patterns, retirement income arrangements are very different across European countries, with a combination of basic, occupational and personal pension schemes, minimum pensions, tax-financed benefits, earnings and other sources of

retirement income (OECD, 2015). Nevertheless, in all countries the bulk of income in old age is represented by second pillar pensions, ranging from 40% to 50% of disposable income for the elderly population in Ireland and the UK to more than 85% in the majority of other countries. In countries adopting the *basic security* model (such as Denmark, Sweden, the UK, Ireland and the Netherlands), the proportion of disposable income from second pillar benefits decreases across income deciles. The same pattern can be seen for eastern European countries. On the other hand, in countries that have strong 'Bismarckian' earnings-related schemes (e.g. Austria, France, Germany and the southern European countries), second pillar pensions are distributed more toward the upper end of the income scale than the lower end.

In most European countries, third pillar pensions are virtually non-existent (although it is possible that in some cases they are misrecorded as capital income in the original surveys). The main exceptions are Denmark and the UK, where private pensions represent 19% and 30%, respectively, of elderly people's disposable income.

4. EMPIRICAL EVIDENCE

Exploiting the microsimulation approach presented above, we compare each Member State's current tax regime (i.e. baseline scenario) with the E-T counterfactual scenario characterized by exemption treatment in the accumulation phase and taxation treatment in the decumulation phase. The results are exposed and analyzed to highlight specificities and common patterns across EU countries in terms of the size of the pension-related tax expenditures and their distributional impact across cohorts and income groups. Moreover, in line with the recognized social and

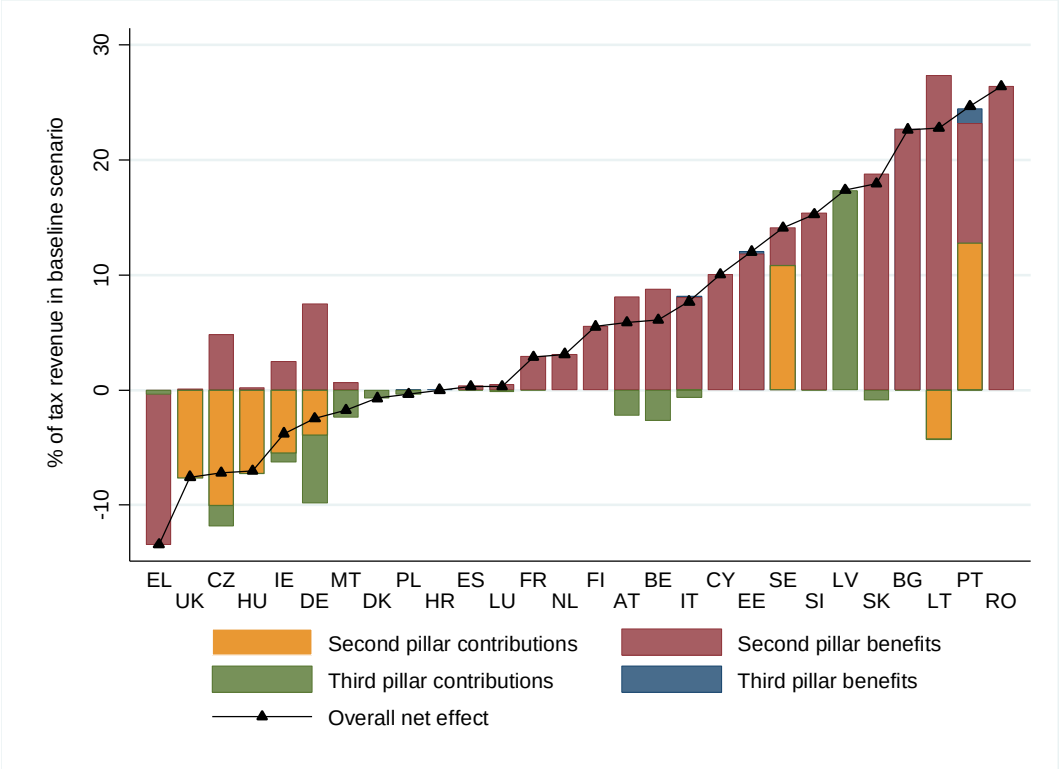
economic goals of the tax expenditures, their impact is related to their effectiveness in reducing intergenerational poverty and addressing intragenerational redistribution over an individual's lifetime.

4.1 The Budgetary Size of Pension-related Tax Expenditures in EU Countries

Figure 2 highlights that the budgetary impact of pension-related tax expenditures is clearly differentiated across countries, representing a substantial proportion of revenue in most. For the large majority of Member States, all pension-related tax expenditures considered together represent a net cost in terms of foregone revenue ranging from almost 0% in Croatia, Luxembourg and Spain to around 25% in Portugal and Romania. In nine countries, negative pension-related tax expenditures determine instead an extra revenue of up to 13% as in case of Greece.[13]

As described above, we analyze separately the tax expenditures related to the second and third pillar pension schemes, as defined by the OECD taxonomy, and those related to the accumulation and decumulation phases.

[13] Appendix Table A4 shows the pension-related tax expenditures as a percentage of old-age pension benefit expenditures. These represent more than 10% of old-age pension benefit expenditures in Bulgaria, Estonia, Latvia, Lithuania, Portugal, Romania and Sweden.



Source: Authors' simulations with EUROMOD H0.34. Tax expenditures measured comparing the baseline with E-T counterfactuals. See Table A2 in the Appendix for details.

Figure 2. Revenue Cost of Pension-related Tax Expenditures, 2017

Focusing on the fiscal treatment of the second pillar pension benefits, in most countries the revenue cost observed is from the existing exemption of pensions from income tax (Lithuania, Bulgaria and Slovakia), and in the remaining countries it is from the specific tax reliefs related to

pension incomes (red bars in Figure 2). The cost, expressed as a percentage of tax revenue in the baseline scenario, ranges from around 3% in Ireland, France, the Netherlands and Sweden to 27% in Lithuania. The main exception to this pattern is Greece, where pension incomes are subject to an extra levy in the form of pensioners' solidarity contributions, which lead to an increase in the tax revenue of about 13%. This kind of extra levy is implemented as part of fiscal consolidation measures, dictated by the international triumvirate of donors (the EU, the European Central Bank and the International Monetary Fund) after the onset of the Great Recession (Matsaganis & Leventi, 2014). Owing to the relatively limited spread of third pillar schemes across Europe, the budgetary effects of tax relief applied to third pillar pension benefits is negligible and appears relevant in only Portugal (blue bars in Figure 2), where benefits are exempt from income tax.

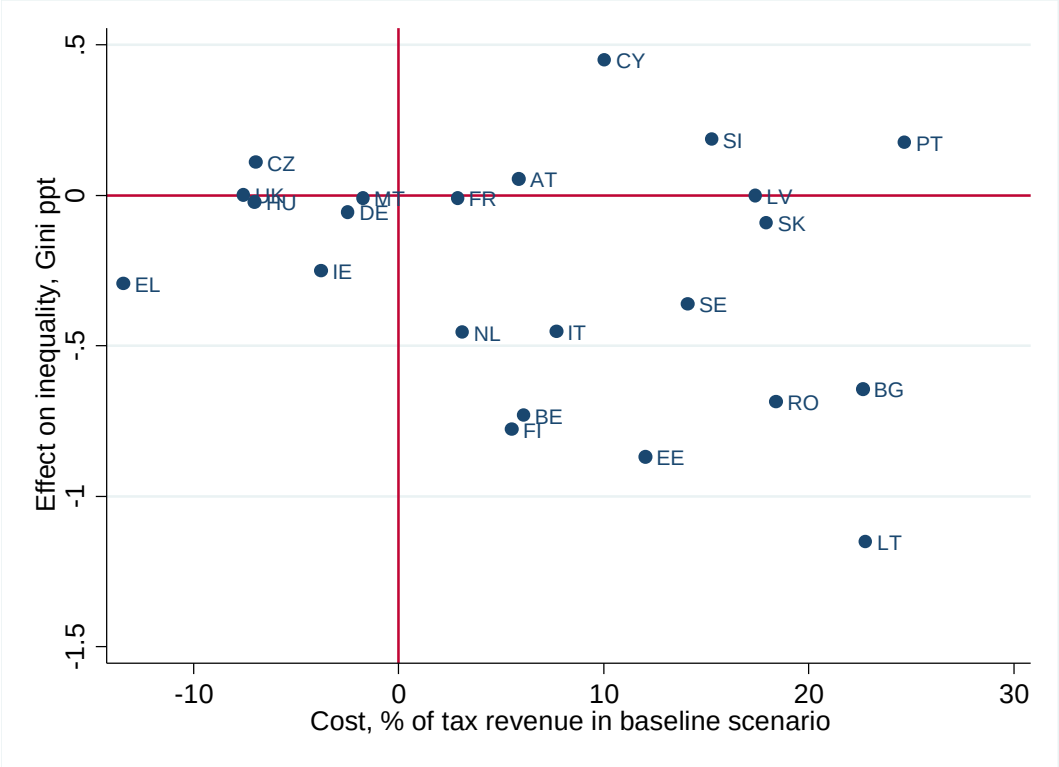
The baseline tax regime includes some negative tax expenditures, which are a way of collecting extra revenue, compared with the E-T counterfactual. More specifically, social insurance contributions related to the second pillar are not fully deducted from the taxable income in the Czech Republic, the UK (for the state pension), Hungary, Ireland, Germany and Lithuania (orange bars in Figure 2). In a number of countries, third pillar pension contributions are not deductible or are deductible with limits, with an apparently relevant budgetary effect in the Czech Republic, Germany, Austria, Belgium and Malta (green bars in Figure 2).

Sweden and Portugal are unusual in terms of their tax treatment of second pillar contributions, which are deducted with a minimum threshold in Portugal and credited against positive tax liability in Sweden so that they imply a net cost of about 13% and 11% of tax revenues, respectively (orange bars in Figure 2).

Common factors can be seen in countries that are similar according to the Korpi and Palme (1998) welfare states taxonomy and that are in geographical proximity. Among those countries with positive tax expenditures due to tax relief associated with pension benefits, *corporatist* countries have the lowest tax expenditures (Spain, Luxembourg, France, the Netherlands, Austria, Belgium and Italy), while eastern European countries have the highest tax expenditures (Latvia, Bulgaria, Lithuania and Romania). In turn, the countries with negative tax expenditures related to the tax treatment of social contributions are those adopting a *basic security* pension system, namely the UK and Ireland. The Czech Republic and Hungary, characterized by their adherence to the *corporatist* model, show the largest negative tax expenditures, which originate from the recently introduced regime of flat income tax that does not allow the deduction of any social contributions.

4.2 The Distributional Effects of Pension-related Tax Expenditures

As expected, the correlation between pension-related tax expenditures' revenue cost and their impact on income inequality is –0.32, significant at the 10% level. In most countries, pension-related tax expenditures determine a lower level of inequality in the overall income distribution, with only Cyprus showing an increase of about 0.5 percentage points. The Gini coefficient decreases more than one percentage point in Lithuania and more than 0.5 percentage points in Belgium, Bulgaria, Romania, Finland and Estonia (see Figure 3).



Source: Authors' simulations with EUROMOD H0.34. Tax expenditures measured comparing the baseline with E-T counterfactuals. Croatia, Denmark, Luxembourg, Poland and Spain show a cost of pension-related tax expenditures, as a percentage of tax revenue in the baseline scenario, of close to 0 and so are not included in the figure.

Figure 3. Impact of Pension-related Tax Expenditures on Inequality, 2017

The average relative decrease in Gini index observed in our simulations is only slightly below that observed by Doerrenberg and Peichl (2014) for the effect of public social expenditures. Indeed, those authors found that a 1% increase in public social expenditure is roughly related to a decrease in inequality of 0.2%. Focusing on countries where tax expenditures represent a net cost for the government, we observe that a 1%

increase in tax revenue is, on average, related to a 0.13% reduction in inequality, suggesting that pension-related tax expenditures are a targeted tax instrument that may have a non-negligible effect on inequality.

In addition, the same target of reduction of inequality is achieved in countries that use resources in very different ways. In some countries with negative tax expenditures, a reduction in inequality is nevertheless observed. This evidence suggests that tax expenditures in these countries represent a cost that falls mostly on middle- and high-income individuals. Instead, in countries that are characterized by high or very high tax expenditures, the heterogeneity in the final effect on income distribution is considerably high, and ranges from the –1.2 percentage points of the Gini index observed for Lithuania, in view of tax expenditures corresponding to 22% of the tax revenue, to the almost 0 percentage points of the reduction in the Gini index observed for Portugal in view of tax expenditures that reach 25% of tax revenue.

As expected, with tax instruments that, overall, treat pension benefits favorably but in some countries impose a tax burden on social contributions, pension-related tax expenditures imply a redistribution of resources across generations. By looking at changes in equivalent disposable income by age group, Figure 4 shows the extent to which pension-related tax expenditures favor pensioners over the working-age population even within the same country. Pensioners gain more than 5% of their income from tax expenditures in Austria, Belgium, Bulgaria, Estonia, Finland, Germany, Italy, Latvia, Lithuania, the Netherlands, Portugal, Romania, Sweden, Slovakia and Slovenia. Notably, in Austria, Belgium, the Czech Republic, Germany, Ireland and Malta, younger people not only receive less than older generations, but even bear a net cost due to negative tax expenditures. In Greece, Hungary and the UK, the presence of negative tax expenditures implies a negative effect on disposable income for all generations.

The distribution of tax expenditures by age group could offer interesting insights into the political economy literature on the relationship between population ageing and the generosity of the social security system. Focusing on the pension system, Galasso and Profeta (2002) and Disney (2007) found that, according to stylized median voter theorem, an increasing dependency rate should determine an increase in pension benefits and contributions. Nevertheless, our estimates of pension-related tax expenditures do not show a statistically significant correlation between the dependency ratio and the generosity of tax expenditures in favor of elderly people.

Further insights into the changes in the overall inequality of income distribution can be traced by looking at the variation in the equivalized disposable income by decile of income groups (see Figure 5). The graphs in Figure 5 have different scales across countries, but in a large number of countries the variation of disposable income is above 2% of the income in the corresponding decile group, and some common patterns emerge. Tax expenditures over decile groups are progressive (i.e. the poorest individuals receive relatively more than the richest) in Belgium, Bulgaria, Estonia, Finland, France, Italy, Latvia, Lithuania, the Netherlands and Romania. Tax expenditures are regressive in Cyprus and Slovenia, while in Austria, Portugal, Slovakia and Sweden their effect on disposable income is flat or characterized by an inverted U-shape. In all countries where tax expenditures imply a net gain in aggregate revenue, this gain comes mostly from individuals in the top part of the distribution with an overall progressive impact from the richest people paying more taxes.

In Figure 5, the change in disposable income by decile groups is further broken down into three types of household: working age, pensioner and multigenerational, where people of working age and pensioners cohabit.[14] Across countries, pensioners take advantage of pension-related tax

[14] Working-age households are those with at least one individual of working age and nobody in old age. Pensioner households are those with at least one individual in old age and nobody of working age.

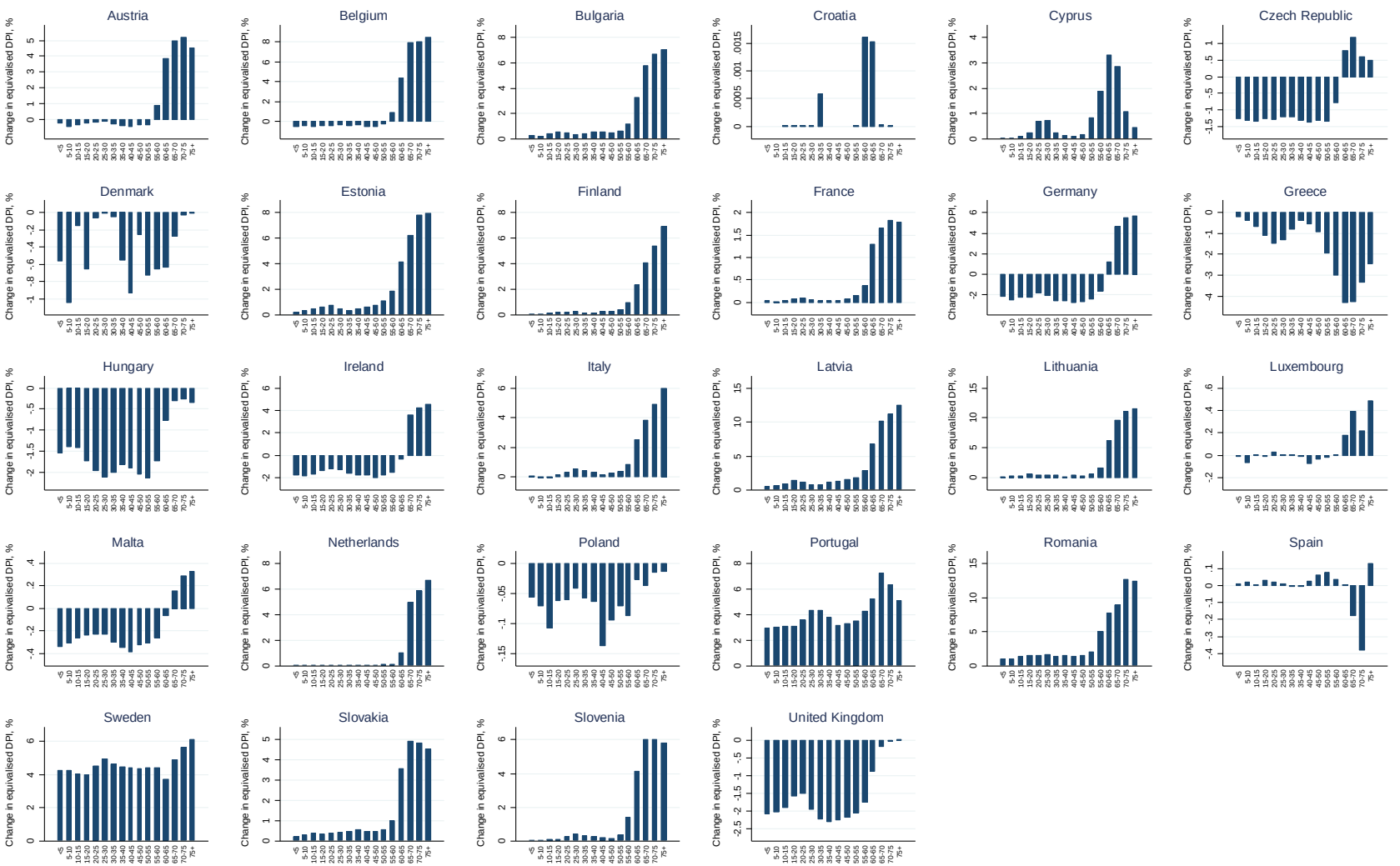
expenditures (mainly through tax relief on pension incomes), with a stronger positive impact on disposable income in the lower-middle part of the income distribution. By contrast, working-age households, in particular in the middle-top part of the income distribution, are penalized by pension-related tax expenditures (mainly through non-deductibility of social contributions) in all countries where this produces a net gain in terms of revenue, as well as in Austria and Germany.

These results suggest that, overall, pension-related tax expenditures can be progressive on two levels: first, among pensioners, by favoring lower-income pensioners (mainly through a favorable tax treatment of pension incomes), and, second, among working-age individuals (through partial or no deduction of pension contributions) draining resources in particular from those at the top of the income distribution. A welfare evaluation of such tax expenditures, beyond the scope of this paper, should take into account that tax expenditures in the first group represent a net cost in terms of tax revenue, while those in the second group are revenue-generating tax instruments.

As pointed out in the literature, tax expenditures addressing pension benefits are normally driven by redistributive aims. To provide some descriptive insights on the effectiveness of current tax expenditures in targeting these goals, we show the correlation between the revenue cost and the reduction in poverty among elderly people with respect to the baseline scenario (Figure 6).

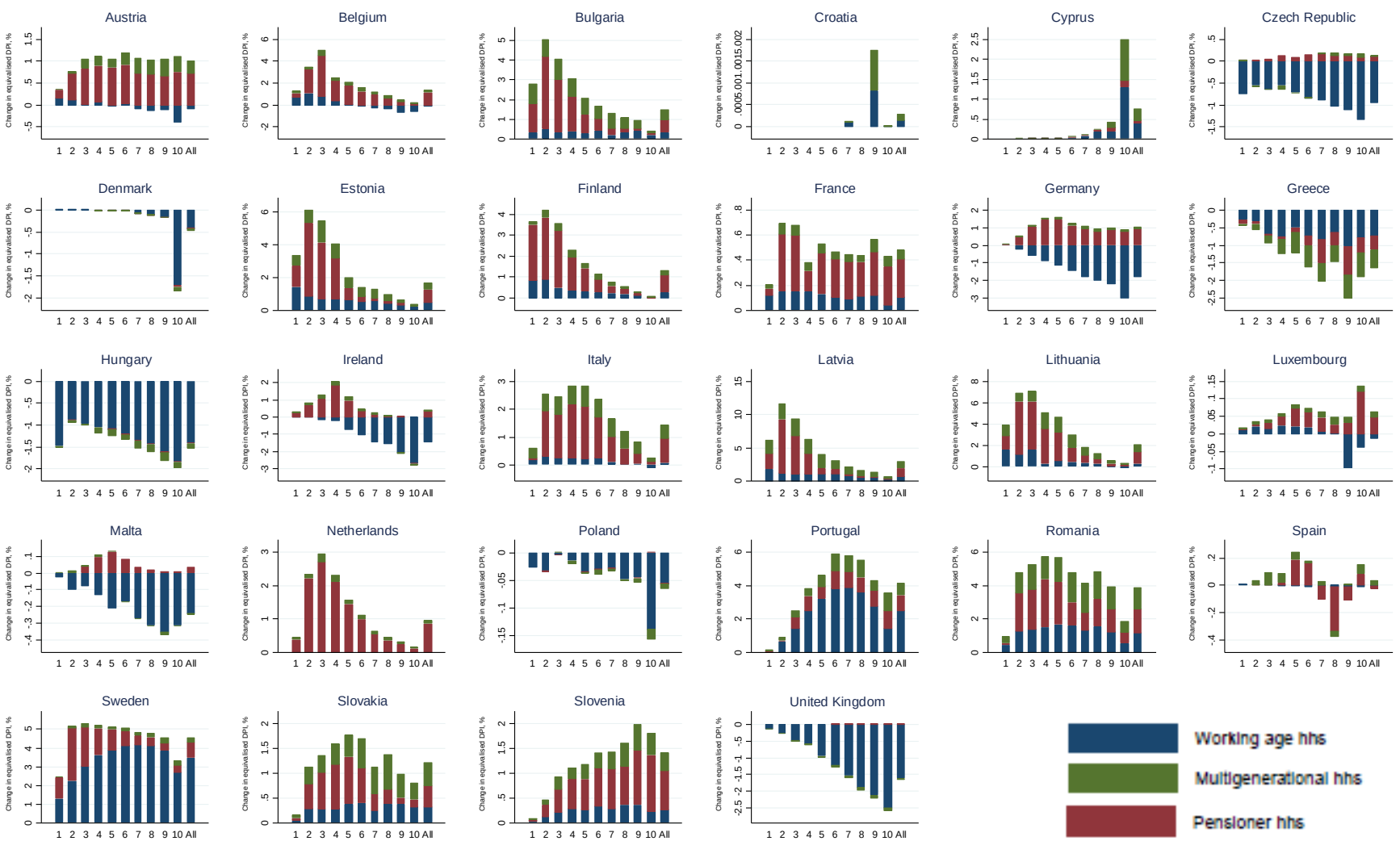
From Figure 6, it is clear that tax expenditures related to pension benefits lead to a significant reduction in the poverty rates among elderly people (from 2 to 15 percentage points) in the vast majority of EU countries, showing a strong and positive correlation between the resources dedicated to such tax expenditures and the reduction in old-age individuals at risk of poverty. On average, 1% of disposable income accrued from tax expenditures is related to a reduction of about 19% in poverty rates among elderly people. Such a correlation is relevant when

compared with a reduction of about 30% for each percentage point of disposable income received from first pillar pensions, the aim of which is to target and reduce poverty (Figari, Matsaganis, & Sutherland, 2013). Nevertheless, in a large number of countries the relationship between cost and poverty reduction effectiveness is much weaker, with an unclear link between relevant budgetary amounts and poverty reduction. In countries where pension benefits are subject to higher taxation than in the counterfactual, namely Greece and the Czech Republic, the tax expenditures that represent an overall gain in tax revenue do not affect poverty rates among elderly people, confirming that the burden of these is mainly on rich pensioners.



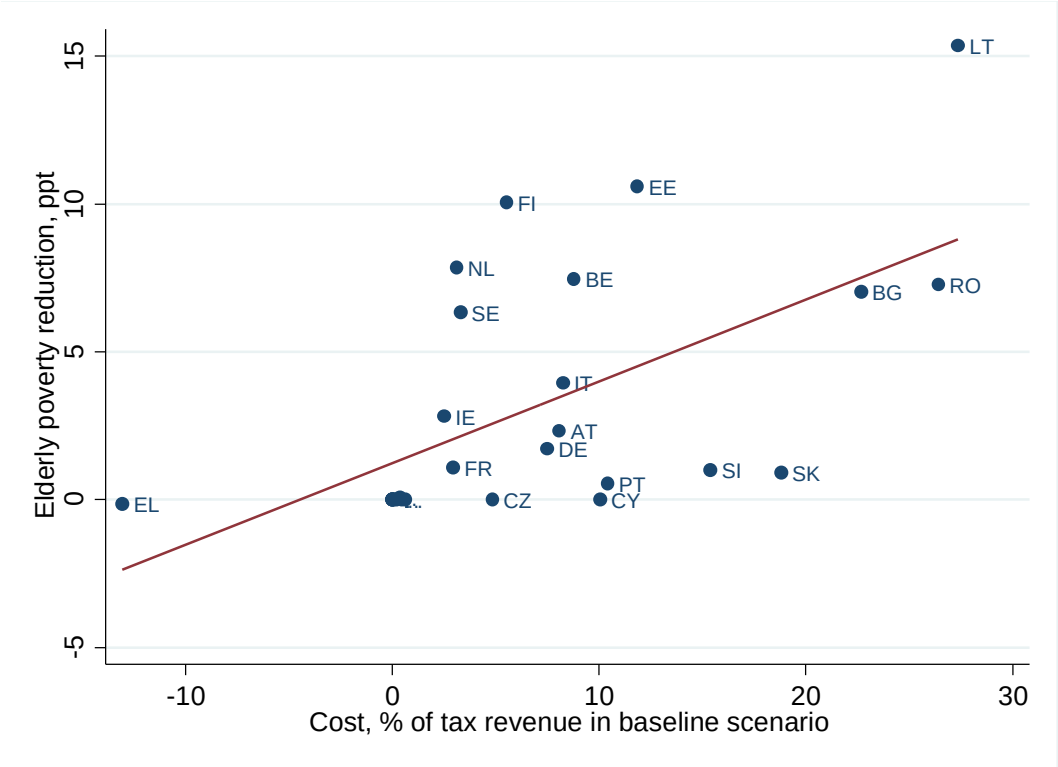
Source: Authors' simulations with EUROMOD H0.34. Tax expenditures measured comparing the baseline with E-T counterfactuals. Change in equivalized disposable income (DPI) for individuals in 16 age groups. Income equivalized using the OECD modified equivalence scale. Different scales across countries.

Figure 4. Changes in Disposable Income by Age Group due to Pension-related Tax Expenditures, 2017



Source: Authors' simulations with EUROMOD H0.34. Tax expenditures measured comparing the baseline with E-T counterfactuals. Change in equivalized disposable income (DPI) by decile groups based on equivalized disposable income in the baseline. Income equivalized using the OECD modified equivalence scale. Different scales across countries.

Figure 5. Change in Disposable Income by Household Type and Decile Group due to Pension-related Tax Expenditures, 2017



Source: Authors' simulations with EUROMOD H0.34. Tax expenditures measured comparing the baseline with E-T counterfactuals. Croatia, Denmark, Hungary, Luxembourg, Latvia, Malta, Poland, Spain and the UK show a cost of tax expenditures on pension benefits, as a percentage of tax revenue in the baseline scenario, of around 0 and so are not labelled in the figure. R^2: 0.35.

Figure 6. The Effectiveness of Tax Expenditures on Pension Benefits in Addressing Poverty Rates Among Elderly People, 2017

4.3 Pension-related Tax Expenditures Over the Life Cycle

Ideally, an analysis of the size and the effects of pension-related tax expenditures would adopt a lifetime perspective (Feher & Jousten, 2018), following each individual from working age to retirement and calculating the present value of tax expenditures faced over the life cycle. However, this would require a dynamic microsimulation model for each country, able to simulate over a lifetime, year by year, for each individual, labor market transitions, career profile, contributions, maturation of pension rights and pension benefits. The design and realization of such dynamic microsimulation models are very complex and time-consuming, and not many EU countries have such a model. In addition, these models require assumptions about the evolution of the pension and taxation rules over a very long, lifetime period, making

the whole approach potentially unreliable, in particular when using a cross-country perspective. At the national level, existing studies normally have a narrower scope than the one used in this paper, and they focus on only the redistributive effects of specific cohorts of individuals, of particular tax-benefit instruments or of policy changes.

Nevertheless, we extend the cross-sectional estimates provided in the previous sections over a lifetime, borrowing a methodology developed in the generational accounting literature (Auerbach et al., 1994) and adapted by Ter Rele (2007) to measure, in terms of present values, the redistributive effects of the tax-benefit system over the entire life cycles of average representative individuals.

We start by building the average age profile of pension-related tax expenditures by gender and by educational level in 2017 (the time, *t*, of our cross-sectional analysis). That is, we partition the population into three groups according to education level (high, medium and low) and then by gender (male and female): two dimensions usually considered good proxies of individual permanent income. F for each subgroup we compute the average tax expenditures (TEs) at the ages of 25, 26, … , 80 years:

$$TEs_{t,\ age=25}\ , TEs_{t,\ age=26,}\ \ldots\ TEs_{t,\ age=80}$$

Starting from these cross-sectional age profiles, as in the generational accounting literature, we assume a given level, *g*, of the nominal GDP growth rate and, for each educational and gender group, we approximate the cohort age profile of tax expenditures for a 25-year-old individual as:

$$TEs_{t,\ age=26}\ TEs_{t+2,\ age=27} = TEs_{t,\ age=27} * (1+g)\text{^}2$$

…

$$TEs_{t+(80-25),\ age=80} = TEs_{t,\ age=80} * (1+g)\text{^}(80-25)$$

We assume that the average individual we currently observe will, in 1 year, aged 26 years, face the pension-related tax expenditures observed for the average individual who is currently

26 years old, augmented only for economic growth. The whole estimation assumes invariance in the demographic composition and socioeconomic characteristics of individuals across cohorts, in the tax-benefit and pension rules. If these assumptions clearly represent a methodological limitation, the advantage of such a method lies in its transparency and relative simplicity, which makes it feasible when using a cross-country perspective.

From the cohort age profile, it is then possible to compute the present value of the pension-related tax expenditures at the beginning of the career:

$$\text{VA\_TEs}_{\text{t,age=25}} = \sum_{i=0}^{(80-25)} \text{TEs}_{\text{t,age=25+i}} \left(\frac{1+g}{1+r}\right)^{i} \text{l}_{\text{age=(25+}i\text{)}}$$

where $\text{l}_{\text{age=(25+i)}}$ is the probability of the average 25-year-old being alive at age 25+i, assumed to be equal to 1. The current values presented in this paper are computed assuming a discount rate of 2% and a GDP nominal growth rate equal to 1.3% corresponding to the potential average GDP annual growth rate for the EU projected for 2016 to 2070 (European Commission, 2017).

This extension allows us to complement the cross-sectional inter-generational distributive approach with an intra-generational analysis highlighting the size of pension-related tax expenditures across categories of individuals defined by gender and educational attainment over their lifetimes.

Figure 7 shows the present value, by gender and education, of the pension-related tax expenditures defined using the E-T counterfactual as in the cross-sectional analysis. For each country, the present value is expressed as a percentage of gross income quantifying the extent to which, over the life cycle, the existing tax expenditures represent a tax relief (positive) or a tax burden (negative), with a measure equivalent to a traditional tax rate. In most countries the present value of tax expenditures represents a non-negligible share of gross income

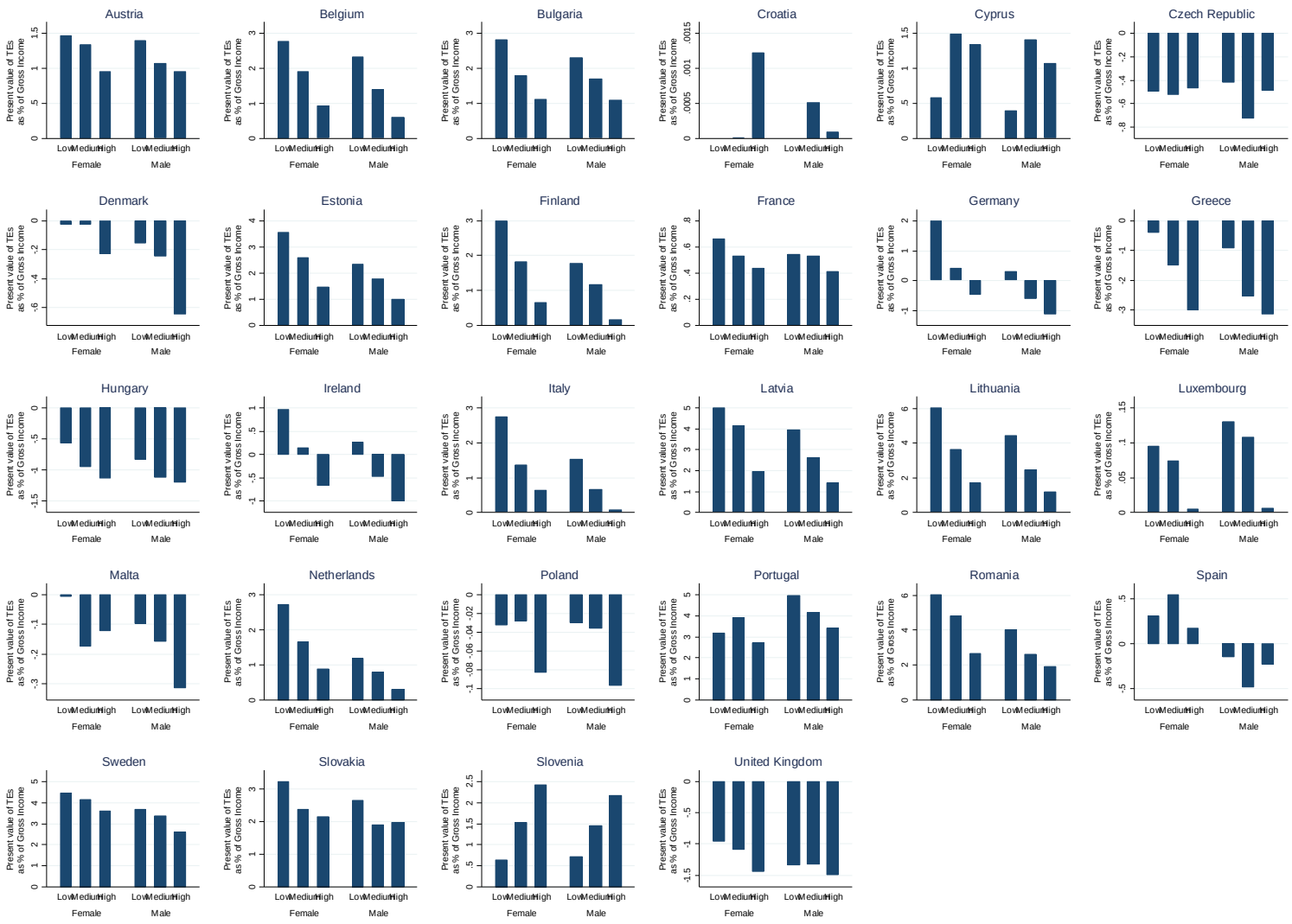
confirming the relevant role of tax expenditures in determining the lifetime individual resources.

The results can be divided into two groups and show a pattern consistent with the evidence reported in the cross-sectional analysis. On the one hand, countries where tax expenditures represent a cost for the government show a positive present value of tax expenditures, in particular for women and for individuals with a low level of education. For women with a low level of education, for example, the present value of tax expenditures ranges from less than 1% of gross income in Austria, France, Luxembourg, Spain and Ireland to almost 4% in Italy, Finland, Belgium, Bulgaria, Estonia, Finland, Sweden and the Netherlands. In Latvia, Lithuania, and Romania it reaches more than 5%. This is in line with the fact that such tax expenditures are mainly channeled through tax relief associated with second pillar benefits, with a clear redistributive effect toward the bottom of the income distribution.

On the other hand, countries where tax expenditures represent a revenue gain for the government show a negative present value of tax expenditures, particularly for highly educated individuals as in Denmark, Malta, Greece, UK, Ireland, Hungary and Poland. In absolute values, the highest negative tax expenditures amount is observed for Greece in which it reaches for high educated males -3% of gross disposable income. This is consistent with the fact that such tax expenditures are mainly channeled through the taxation of pension contributions, with higher burdens on those with higher earnings.

Moreover, the life cycle perspective allows us to highlight compensative effects across different groups of individuals. For example, in Spain the positive present value of pension-related tax expenditures in favour of women seems to be almost compensated by the negative pension tax expenditures sustained by men. Analogously in Germany and Ireland the positive pension related tax expenditures in favour of low educated seem to be compensated by the negative tax expenditures bore by high educated.

While any such evidence over the life cycle has to be taken with a grain of salt, these results confirm the redistributive effects of tax expenditures when they are evaluated against a EET benchmark. The empirical evidence provides further insights into the intra-generational distributive pattern in favor of individuals in the bottom part of the income distribution and of the additional tax burden on the shoulders of the high earning workers over their lifetimes.



Source: Authors' simulations with EUROMOD H0.34. Tax expenditures measured comparing the baseline with E-T counterfactuals. Present value of tax expenditures (as % of Gross Income in the baseline) based on a discount rate set at 2% and GDP nominal growth set at 1.3%. Different scales across countries.

Figure 7. Current Life Cycle Value of Pension-related Tax Expenditures

5. CONCLUSIONS

Despite the wide use of tax expenditures across EU Member States, governments put little effort into investigating their real weight in public budgets and, above all, their fiscal and equity impacts. Nevertheless, such an evaluation is worthwhile, especially in the current context of constrained public finances.

This paper is the first attempt to provide a cross-country comparable quantification of the fiscal and equity impacts of pension-related tax expenditures, which, in some circumstances, could effectively replace social policy programs. We take a microsimulation approach, using the EU-wide microsimulation model EUROMOD, to evaluate how tax expenditures interact with the broader provisions of the tax-benefit systems across EU Member States. Overall, the empirical analysis suggests that the revenue impact of pension-related tax expenditures can be sizeable, ranging from –13% of the baseline tax revenue in Greece to +26% in Romania. Moreover, and partly in contrast with the available empirical evidence outside Europe, pension-related tax expenditures tend to be progressive at two levels: first, among pensioners, by favoring lower-income elderly people (mainly through a favorable tax treatment of pension incomes), and, second, among working-age individuals (through partial or no deduction of pension contributions) draining resources in particular from those at the top of the income distribution. Moreover, embracing a lifetime perspective, tax expenditures tend to redistribute resources in favor of women and low educated individuals. A welfare evaluation of such tax expenditures, beyond the scope of this paper, should take into account that tax expenditures in the first group represent a net cost in terms of tax revenue, whereas those in the second group are revenue-generating tax instruments.

The recent economic downturn has seriously aggravated the underlying challenges posed by ageing, and more needs to be done to improve the efficiency of pension schemes across Europe (European Commission, 2010). The capacity to guarantee the adequacy and sustainability of pension systems will also depend on their interaction with the overall tax-benefit system.

The role of tax expenditures, which are particularly effective in decreasing overall inequality and poverty rates among elderly people, will become even more relevant, with more of the financial risk being borne by private individual pension plans and with reduced redistribution in favor of lower-income individuals through public pension systems. Projections show that, in most European countries, by 2050 more than 30% of those aged over 75 years will be at risk of poverty (Zaidi, Grech, & Fuchs, 2006), compared with a European average of 20% in 2009.

In this context, the evidence provided in this paper not only matters in its own right but can, in principle, offer valuable insights into the redesign of the overall fiscal benefit systems in an attempt to make it more functional and to harmonize the tax and pension system rules. As suggested by Cremer and Pestieau (2016), the distortions implied by the pension systems depend on both the benefit formula and the taxation of labor and pension incomes at different stages of an individual's life. From a methodological perspective, there is a growing need to further develop microsimulation approaches to evaluate the joint redistribution effort embedded in the public pension rules and in the tax system. Across countries, the system can be generous and highly redistributive, but it can also have perverse effects, with net transfers from poor to rich individuals and between cohorts, that need to be carefully considered. This poses interesting and challenging issues for future research.

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APPENDIX

Table A1. Pension-related tax expenditures as simulated in EUROMOD (2017) based on EU-SILC data

Country	Second pillar		Third pillar	
	Contributions	Benefits	Contributions	Benefits
Austria	**Exempt**	**Partially taxed** • Extra pensions taxed separately • Exceptional tax allowance based on pension income • Tax credit for pensioners	**Taxed** • Contributions not deducted	**Taxed**
Belgium	**Exempt**	**Partially taxed** • Tax credit for pension income	**No information available**	**Taxed**
Bulgaria	**Exempt**	**Exempt** • Pensions not taxed	**Partially exempt** • Contributions deducted with limits	**Exempt**
Croatia	**Exempt**	**Partially taxed** • Pension allowance	**Partially exempt** • Contributions deducted with limits	**Exempt**
Cyprus	**Exempt**	**Partially taxed** • Non-taxable old-age and survivor pensions	**Partially exempt** • Contributions deducted with limits	**Taxed**
Czech Republic	**Taxed** • Contributions not deducted	**Partially taxed** • Pensions exempted (taxed only at amounts more than 36 times the minimum wage)	**Partially exempt** • Contributions deducted with limits	**Taxed**
Denmark	**Exempt**	**Taxed**	**Partially exempt** • Contributions deducted with limits	**Taxed**
Estonia	**Exempt**	**Partially taxed** • Pension allowance	**Partially exempt** • Contributions deducted with limits	**Partially taxed** • Pensions taxed at a lower rate

Finland	**Exempt**	**Partially taxed** • Pensioners' allowance • Special tax on pensions • Local tax: pension income allowance	**Partially exempt** • Contributions deducted with limits	**Taxed**
France	**Exempt**	**Partially taxed** • Tax deduction for pension incomes (with minimum and maximum "abatement")	**Partially exempt** • Contributions deducted with limits	**Taxed**
Germany	**Partially exempt** • Contributions deducted with limits	**Partially taxed** • Tax-exempt part of pensions • Allowance for high contribution pensioners	**Taxed** • Contributions not deducted	**Partially taxed** • Tax-exempt part of pensions
Greece	**Exempt**	**Taxed+** • Pensioners' (and additional) solidarity contribution	**Taxed** • Contributions not deducted	**Partially taxed** • Pensions taxed at a lower rate
Hungary	**Taxed** • Contributions not deducted	**Partially taxed** • Survivor pensions not taxed	**Taxed** • Contributions not deducted	**Exempt**
Ireland	**Partially exempt** • Contributions deducted with limits	**Partially taxed** • Age-related tax credit	**Partially exempt** • Contributions deducted with limits	**Taxed**
Italy	**Exempt**	**Partially taxed** • Income tax credit for pension incomes	**Partially exempt** • Contributions deducted with limits	**Partially taxed** • Pensions taxed at a lower rate
Latvia	**Exempt**	**Partially taxed** • Pensioners' tax allowance	**Exempt**	**Exempt**
Lithuania	**Taxed** • Contributions not deducted	**Exempt** • Pensions not taxed	**Partially exempt** • Contributions partially credited against income tax liability	**Taxed**

Luxembourg	**Exempt**	**Partially taxed** • Pensioners' allowance • Additional pension from employer non-taxable	**Partially exempt** • Contributions deducted with limits	**Partially taxed** • Pensions taxed partially
Malta	**Exempt**	**Partially taxed** • Survivor pensions not taxed	**Taxed** • Contributions not deducted	**Taxed**
Netherlands	**Exempt**	**Partially taxed** • Old-age asset allowance • Old-age credit	**Exempt**	**Taxed**
Poland	**Exempt**	**Taxed**	**Taxed** • Contributions not deducted	**Exempt**
Portugal	**Exempt+** • Contributions related to employment income deducted with minimum	**Partially taxed** • Pensioners' tax allowance	**Taxed** • Contributions not deducted	**Exempt**
Romania	**Exempt**	**Partially taxed** • Pensioners tax allowance	**No information available**	**No information available**
Spain	**Exempt**	**Partially taxed** • Personal tax credit, supplement for elderly people • Employment income tax allowance supplement for elderly people • Regional tax credits related to age (Canary Islandsias, Castilla-La Mancha)	**Partially exempt** • Contributions deducted with limits	**Taxed**
Sweden	**Exempt+** • Contributions credited against income tax liability • Contributions paid by self-employed not deducted	**Partially taxed** • Additional basic allowance for pensioners	**Taxed**	**Taxed**

Slovakia	**Exempt**	**Exempt** • Pensions not taxed • Old-age public pensions deducted from basic allowance (i.e. old-age pensioners have lower allowance)	**Taxed**	**Taxed**
Slovenia	**Exempt**	**Partially taxed** • Pensioners' allowance	**Partially exempt** • Contributions deducted with limits	**Taxed**
United Kingdom	**Partially exempt** • Contributions to state pension not deducted	**Partially taxed** • Married couples' allowance	**Exempt**	**Taxed**

Notes: Exempt+ stands for tax relief that exceeds the value of the contribution. Taxed+ stands for a tax rate on pension incomes higher than the tax rate on other incomes. The classification of contribution and pension benefits in the different pillars also reflects the classification of EU-SILC variables. In some countries, variables related to the second pillar might also include components of the first pillar (i.e. integration of public pensions to the minimum amount). Variables related to the third pillar refer to the voluntary pension instruments as reported in the EU-SILC data ("Contributions made, during the income reference period, to individual private pension plans refers to the pensions policies taken out by individual households on their own initiative and for their own benefit, independently of their employers or government and outside any social insurance scheme" and "Regular pensions from private plans refer to pensions and annuities received, during the income reference period, in the form of interest or dividend income from individual private insurance plans, i.e. fully organised schemes where contributions are at the discretion of the contributor independently of their employers or government"). Within this category, the tax regime simulated in EUROMOD is the one applied to the most common scheme in each country. In the case of the UK, it is not possible to disentangle the proportion of contributions devoted to financing the state pension. We computed the state pension expenditure as a proportion of total expenditure of insurance-based benefits from the Department for Work and Pensions (DWP) expenditure and caseload forecasts (Spring 2017 edition, https://www.gov.uk/government/publications/benefit-expenditure-and-caseload-tables-2017/ retrieved February 5, 2018) and then we considered only that proportion (i.e. 91.6% as of the 2016–2017 forecast) of the contributions simulated for each individual as a basis for the tax expenditure reported throughout the paper.
Source: EUROMOD country reports based on national legislation and OECD, 2016.

Table A2. Revenue cost of pension-related tax expenditures, percentage of tax revenue in baseline scenario, 2017—counterfactual E-T

Country	Second pillar contributions	Third pillar contributions	Second pillar benefits	Third pillar benefits	Total
	a	*b*	*c*	*d*	*e*
Greece	0.00	–0.37	–13.06	0.00	–13.43
UK	–7.63	0.00	0.07	0.00	–7.56
Czech Republic	–10.01	–1.80	4.84	0.00	–6.97
Hungary	–7.24	0.00	0.21	0.00	–7.03
Ireland	–5.51	–0.75	2.51	0.00	–3.75
Germany	–3.96	–5.93	7.49	0.00	–2.40
Malta	0.00	–2.39	0.66	0.00	–1.73
Denmark	0.00	–0.71	0.00	0.00	–0.71
Poland	0.00	–0.36	0.00	0.01	–0.35
Croatia	0.00	0.00	0.00	0.01	0.01
Spain	0.00	–0.08	0.37	0.00	0.30
Luxembourg	0.00	–0.18	0.47	0.03	0.32
France	0.00	–0.07	2.95	0.00	2.89
Netherlands	0.00	0.00	3.11	0.00	3.11
Finland	0.00	0.00	5.52	0.00	5.52
Austria	0.00	–2.19	8.08	0.00	5.88
Belgium	0.00	–2.69	8.79	0.00	6.10
Italy	0.00	–0.63	8.25	0.09	7.70
Cyprus	0.00	0.00	10.05	0.00	10.05
Estonia	0.00	0.00	11.85	0.18	12.02
Sweden	10.81	0.00	3.30	0.00	14.11
Slovenia	0.00	–0.09	15.38	0.00	15.29
Latvia	0.00	17.35	0.00	0.00	17.34
Slovakia	0.00	–0.86	18.80	0.00	17.94
Bulgaria	0.00	–0.07	22.67	0.03	22.64
Lithuania	–4.31	–0.04	27.36	0.00	23.02
Portugal	12.75	–0.05	10.41	1.29	24.40
Romania	0.00	0.00	26.41	0.00	26.41

Note: The columns in the table (a–e) show the size of tax expenditures with respect to the E-T counterfactual. The countries are ordered by increasing overall net effect of tax expenditures. A positive (or negative) number refers to a revenue cost (or gain) due to the presence of a tax expenditure.

Reading guidelines: In the case of Italy, column b shows a revenue gain of 0.63% of total tax revenue due to the contributions to the third pillar deducted with limits (i.e. partial exemption); column c shows a revenue cost of 8.25% of total tax revenue due to the tax credit on pension incomes (i.e. partial taxation); column d shows a revenue cost of 0.09% of total tax revenue due to the third pillar pension benefits taxed at a lower rate (i.e. partial taxation); and column e shows a total net revenue cost of 7.7% of total tax revenue due to the existing tax-related expenditures with respect to the E-T counterfactual.

Source: Authors' simulations with EUROMOD H0.34.

Table A3. Revenue cost of pension-related tax expenditures, percentage of tax revenue in baseline scenario, 2017—counterfactual T-E

Country	Second pillar contributions *f*	Third pillar contributions *g*	Second pillar benefits *h*	Third pillar benefits *i*	Total *j*
Greece	15.44	0.00	–30.48	0.00	–15.04
UK	0.00	4.44	0.00	–9.00	–4.56
Czech Republic	0.00	0.28	0.00	–0.26	0.02
Hungary	0.00	0.00	–22.48	0.00	–22.48
Ireland	1.93	2.44	–2.24	–0.67	1.46
Germany	8.28	0.00	–10.27	–0.34	–2.33
Malta	16.94	0.00	–4.88	–0.43	11.63
Denmark	6.99	0.54	–11.21	–5.71	–9.39
Poland	9.35	0.00	–25.31	0.00	–15.96
Croatia	59.40	0.02	–4.55	0.00	54.87
Spain	8.26	1.48	–18.13	–3.46	–11.85
Luxembourg	13.47	1.44	–26.01	–0.03	–11.13
France	10.09	0.45	–20.39	–0.04	–9.89
Netherlands	7.84	1.96	–14.71	–0.14	–5.05
Finland	4.22	0.39	–18.39	–2.03	–15.81
Austria	18.05	0.00	–23.77	–2.01	–7.73
Belgium	15.43	0.00	–17.36	–0.27	–2.20
Italy	15.24	1.13	–26.79	–0.09	–10.51
Cyprus	11.83	0.19	–13.59	–0.59	–2.16
Estonia	1.83	0.47	–4.15	–0.19	–2.04
Sweden	18.54	0.00	–20.89	–2.05	–4.40
Slovenia	32.11	0.89	–4.27	–0.10	28.63
Latvia	12.33	0.27	17.34	0.00	29.94
Slovakia	12.63	0.00	–1.72	–0.05	10.86
Bulgaria	9.09	0.04	0.00	0.00	9.13
Lithuania	0.00	0.13	0.00	–0.04	0.09
Portugal	0.00	0.00	–22.88	0.00	–22.88
Romania	8.01	0.00	–4.53	0.00	3.48

Note: The columns in the table (f–l) show the size of tax expenditures with respect to the T-E counterfactual. The countries are ordered by increasing overall net effect of tax expenditures with respect to the E-T counterfactual (see Table A2). A positive (or negative) number refers to a revenue cost (or gain) due to the presence of a tax expenditure.

Reading guidelines: In the case of Italy, column f shows a revenue cost of 15.24% of total tax revenue due to the contributions to the second pillar deducted (i.e. exemption); column g shows a revenue cost of 1.13% of total tax revenue due to the contributions to the third pillar deducted with limits (i.e. partial exemption); column h shows a revenue gain of 26.79% of total tax revenue due to the second pillar pension benefits taxed, although with some tax relief (i.e. partial taxation); column i shows a revenue gain of 0.09% of total tax revenue due to the third pillar pension benefits taxed, although at a lower rate (i.e. partial taxation). Column j shows a total net revenue gain of 10.51% of total tax revenue due to the existing tax-related expenditures with respect to the T-E counterfactual.

Source: Authors' simulations with EUROMOD H0.34.

Table A4. Old-age pension benefits expenditure (2025) and pension-related tax expenditures, 2017—counterfactual E-T

	Old-age pension benefits		Pension-related tax expenditures CounterfactualE-T	
	Millions of national currency	% of GDP	Millions of national currency	% of old-age pension benefits
Belgium	41,729.57	10.20	2,690.30	6.45
Bulgaria	6,868.07	7.80	788.05	11.47
Czech Republic	371,287.76	8.10	–11,037.74	–2.97
Denmark	234,411.31	11.60	–3,681.06	–1.57
Germany	275,740.12	9.10	–7,015.04	–2.54
Estonia	1,431.19	7.00	188.50	13.17
Ireland	12,261.84	4.70	–648.07	–5.29
Greece	25,341.03	14.40	–1,214.95	–4.79
Spain	104,413.98	9.70	202.52	0.19
France	281,410.17	12.80	5,676.79	2.02
Croatia	23,918.98	7.10	0.46	0.00
Italy	233,795.00	14.20	13,522.09	5.78
Cyprus	1,819.00	10.30	83.03	4.56
Latvia	1,746.06	7.20	339.08	19.42
Lithuania	2,449.65	6.50	374.55	15.29
Luxembourg	3,473.17	6.70	8.15	0.23
Hungary	2,957,125.28	8.60	–152,210.98	–5.15
Malta	688.64	7.40	–8.76	–1.27
Netherlands	74,492.00	10.90	1,650.59	2.22
Austria	44,465.13	12.90	1,786.56	4.02
Poland	159,619.11	9.30	–455.59	–0.29
Portugal	22,521.72	12.50	3,292.74	14.62
Romania	51,328.67	7.20	8,804.60	17.15
Slovenia	3,800.75	9.80	300.64	7.91
Slovakia	5,706.06	7.20	371.38	6.51
Finland	25,906.46	12.40	1,539.14	5.94
Sweden	503,512.00	12.00	88,336.14	17.54
UK	219,361.23	11.60	–14,148.45	–6.45

Note: A positive (or negative) number refers to a revenue cost (or gain).
Sources: Old-age pension benefits expenditure taken from Eurostat (retrieved on April 6, 2018, from http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=spr_exp_nac&lang=en). Pension-related tax expenditures are authors' simulations with EUROMOD H0.34.