JRC TECHNICAL REPORTS

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

Salvador Barrios*, Flavia Coda Moscarola**, Francesco Figari*** and Luca Gandullia[§]

November 2018

Table of contents

Abstract

Policy discussions on pension systems generally focus on their sustainability and design, including retirement age, income reference and contributory period while relative little attention is 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 the EU Member States and little is known on their redistributive or fiscal 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 revenue impact and strong effects on inequality and poverty. Moreover tax expenditures tend to be progressive at two levels. First, among elderly, favoring lower income pensioners, mainly through a favorable treatment of pension incomes. Second, among working-age individuals, through partial or no deduction of pension contributions, draining resources from those at the top of the income distribution.

1 Introduction

Tax expenditures are usually defined as "exceptional tax treatments with respect to a generally agreed benchmark tax system" (Burton and Sadiq, 2013). Such level of generality is deliberate because of the specific feature of tax expenditures (TEs): TEs can be "positive" to the extent that they represent a reduction in tax liability or "negative" to the extent that they increase the tax burden. While recent EU legislative measures recognise the relevance of accounting and measuring the impact of TEs, the EU Member States practices, including methods, details and timeliness, differ notably (Kalyva et al., 2014) so that a cross-country comparison of size and redistributive effects of TEs, based on nationally provided information, is extremely complex if not impossible.

Notwithstanding the conceptual and measurement issues, there is a general agreement on the fact that tax expenditures add up to a non-negligible share of GDP in many European Member States (OECD, 2003, 2010; Kalyva et al., 2014), as in the US (Toder, 2000; Burman et al., 2008). In particular, it is well recognised that the pension systems are generally subject to a favourable tax treatment (OECD, 2015, 2016) and pension-related TEs, together with those related to health and housing, can potentially generate significant redistributive and long-run effects on the sustainability of public finances. However pension-related TEs received limited attention in the public debate about pension reforms as well as in the academic literature. In practice, reforms affecting pension-related TEs are rarely considered by governments. Pension reforms generally focus on the design of 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 against potential long-term (and politically less attractive) economic gains (Feher and Jousten, 2018). The existing literature dealing with pension systems has generally overlooked pension-related TEs, not least because of the difficulty of measuring them and the relative "invisibility" of TEs in the budgetary process. However, pension-related TEs can be considered as a soft redistribution device compared to direct income support (Stebbing and Spies-Butcher, 2010) which makes them a politically desirable alternative to public spending programmes, with both taxes and public spending seemingly lower (Burman and Phaup, 2012). Recently, a number of national studies advocate for striking a better balance between the redistributive properties of existing pension-related TEs and their fiscal cost, see for instance Armstrong et al. (2015) for and analysis of the UK case, Caminada and Goudswaard (2008) for the Netherlands and Toder (2009) for the US.

With this paper we aim to fill the existing gap in the literature and policy debate by analysing the fiscal and redistributive implications of existing pension-related TEs in all EU member states, providing the first study over such large number of countries. Our analysis treats pension-related TEs in an integrated way within the tax-benefit system using the EUROMOD microsimulation model (Sutherland and Figari, 2013) to analyse both their fiscal and redistributive impact. A distinctive feature of EUROMOD is that it treats all taxes and social benefits in a comparable way across countries, which allows us to define a common benchmark and to conduct a cross-country comparison of pension-related TEs, setting a stronger base for generalising 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 the year 2017, our reference year. Second, we provide a quantification of their 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 and Sutherland, 2015) in this respect is that the definition of the benchmark system against which TEs can be measured is made transparent. We define counterfactual simulation scenarios in which the existing "exceptional tax treatments" with respect to the benchmark system are removed. The TEs are then quantified as differences, either in terms of tax revenue or disposable income of individuals, between the tax-benefit system actually in place and the benchmark system. We focus on the

second (mainly mandatory occupational schemes) and third (mainly voluntary schemes) pillars of the pension systems - as defined in the OECD taxonomy (OECD, 2015) - and we analyse the TEs related to both contributions and pension benefits of each pillar. For each country, indeed, we define four different counterfactual scenarios related respectively to contributions paid and pension benefits received related to the second and third pillars.

In this paper we adopt as benchmark system the one where pension contributions (and revenue accruals) are exempted and taxes apply when benefits are received. In fiscal literature such a benchmark is known with the acronym EET which signals the Exemption treatment in the accumulation and investment phase and the Taxation treatment in the decumulation phase (Cremer and Pestieau, 2016). As clarified in Section 2, this benchmark is justified on normative grounds since the taxation affects consumption, which is generally considered a less distortive tax base than labour and capital income. The EET benchmark is also justified on practical grounds, as most EU countries follow this system or variant of it. From a policy perspective, individuals are considered as myopic in their saving behaviour and tend to under-invest for retirement such that tax incentives in the accumulation and investment phases can also be considered as necessary to ensure a minimum level of retirement income (Chetty et al., 2014).

In our empirical analysis we 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. 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 PAYG funded. Interests on contributions are computed only notionally and the taxation applies only to the accumulation and decumulation phases (Feher and Jousten, 2018). Nevertheless, for completeness and sake of transparency, in the Annex of the paper we also report empirical evidence of the fiscal effects of pension-related TEs computed by means of counterfactual scenarios characterised by Taxation treatment in the accumulation phase and Exemption treatment in the decumulation phase. Such counterfactuals, while ignoring the investment phase, are the most appropriate to describe the size of pension-related TEs with respect to the alternative income tax benchmark, known with the acronym TTE.

With respect to the EET benchmark, pension-related TEs 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 reasons, is also justified by analogous or even more constrained fiscal treatment of other saving opportunities. On the other hand, tax reliefs related to pension benefits can be considered to some extent as a substitute for the progressive withdrawal of governments from the financing of pensions and a way to support low-income pensioners (Cremer and Pestieau, 2016; Holzmann et al., 2009) and to smooth income over the life-cycle preventing old-age poverty (Dilnot and Johnson, 1993). As clearly emerges from the size and redistributive effects pointed out in our empirical analysis, the limited public attention paid to pension-related TEs stands in clear contrast with their relevance. The evidence provided in our paper can in principle offer valuable insights into the redesign of both the pension and the fiscal benefit systems, for at least four main reasons. First, the analysis of pension-related TEs including their potential reforms, should therefore be performed considering their implications on net disposable in particular because pension-related TEs might trigger important redistributive and fiscal effects in presence of progressive tax systems. Second, current pension-related TEs are sizeable and weigh both on short-term budgetary constraints and long-term sustainability of public finances which also indirectly affect the sustainability of pension systems. Third, pension-related tax expenditures imposing relevant changes into disposable income might influence individuals not only through their consumption and savings (including pension contributions) behaviour, but also their work and retirement decisions (Gruber and Wise, 2004). Thus tax reliefs provide a key signal to individuals with wider economic consequences affecting indirectly the long- run sustainability of pension systems. Fourth, pension-related TEs also act as a major redistributive mechanism from a life cycle perspective especially in cases where these tax

rebates do not match the future pension benefits as it likely to be often the case (Feher and Jousten, 2018). In particular current pension-related TEs can be perceived as being too generous if the expected level of future public services would 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-run sustainability of pension systems.Moreover, our paper provides a methodological approach for estimating (ex-ante) the impact of pension-related TEs on household disposable income that can enrich the calibration of the structural parameters of the fiscal structure of macro models designed to analyse thee macro-economic effects of pension reforms, allowing for the definition of scenarios which track the policy rules implemented in reality rather than using stylised scenarios which are often not plausible specifications for a given country (e.g. Clinton et al., 2011).

The rest of the paper is structured as follows. Section 2 presents the main rationales for the choice of the EET as benchmark system and the microsimulation model used in the analysis in order to define the simulation counterfactual scenarios. Section 3 provides an overview of the pension systems in the European countries focusing on the pension-related tax expenditures currently in place. Section 4 reports the empirical evidence related to the revenue size, the distributional pattern and the fiscal impact over the individual lifecycle of pension-related tax expenditures. The final section concludes.

2 Benchmark, methodology and data

2.1 The tax treatment of pensions and the benchmark for tax expenditures

The taxation of pensions can take place in three possible points in time: i) when part of the income is saved (accumulation phase); ii) when investment income and capital gains accrue (investment phase), and iii) when pension benefits are received (decumulation phase). Given three points at which it is possible to levy taxes, there are several basic tax combinations, but some are more common and characterise 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 Pay As You Go (PAYG) pension systems[2], a favourable tax treatment for pension contributions is widely applied either by excluding pension contributions from the tax base used for calculating personal income taxes or by granting tax rebate to contributions to private pension investment plans. It is important to note that the deductibility of the insurance contribution avoids double taxation of pension savings in two different points in time and it adopted also for public PAYG pension systems even though the second phase is particular as the return to saving 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. These two systems − EET and TEE − when the personal income tax rate is flat are equivalent in effect and neutral between consumption now and in the future (Meade 1978). They 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 although the timing is different (Auerbach 2012): under EET − the 'classical

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[1] The tax exemption of employers contribution to a pension fund on behalf of an employee is instead motivated by the reason that it is not considered as 'income' by the tax law, because employee has no discretion on how to spend it. (Cremer and Pestieau 2016).
[2] *Pay as you go* systems are pensions systems 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.

expenditure tax' – revenues are deferred until retirement, while they are collected immediately under TEE – the 'pre-paid expenditure tax'. The two systems are not equivalent when the personal income tax is progressive and marginal tax rates are different before and after retirement: the individual will benefit more from the EET scheme which grants tax relief before retirement when her marginal tax rate is generally higher, due to earnings higher than pension benefits.

Even if EET and TEE approaches are formally equivalent, there are some arguments to prefer one model over the other. EET can be preferred over TEE in case of imperfect information, myopia, underestimation of survival probabilities, and duality of selves. All factors that make individuals favour immediate gratification over long term concerns and induce individuals to under-invest in saving for retirement. In these cases, the up-front tax relief (EET) is perceived as more valuable (Chetty et al. 2014, Cremer and Pestieau 2016). Nevertheless, it has been shown that the TEE model is risk-taking neutral, while 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 TEE. Moreover, the TEE system makes pension savings less attractive as there is always the risk that future governments will act to tax pension benefits (Feher and Jousten 2018). On practical grounds most OECD countries follow the EET approach in the taxation of both public and private pensions (OECD 2016) with exceptional tax treatments - i.e. tax expenditures - that take the form of partial or limited exemption of insurance contributions or tax reliefs, lower tax rates or exemption of certain pension incomes.

The alternative approaches of pensions taxation are TTE and ETT where investment income and capital gains are also taxed. These systems correspond to a comprehensive income tax which 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.Even if the choice between positive or zero taxation of capital income is still not undisputed in the academic literature (see Banks and Diamond 2010 and Hall 2010), almost unanimously it is argued that in terms of efficiency and equity over an individual's life cycle the consumption tax system (EET or TEE) is still the most appropriate model for the taxation of pension saving (Booth and 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 the identification of tax expenditures in official publications remains a highly controversial issue, as there is no bright line that reveals what provisions in a tax system are parts of the baseline or normative tax system and what provisions are special 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 (so called normative approach) and those that use a country's own tax laws as a basis to define the benchmark (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 classify as tax expenditures elements which might otherwise be considered part of tax design.

In the choice of the benchmark taxation system we follow the normative approach which is more appropriate for international comparisons and less subject – than the legal approach – to subjective and country-specific judgments. As normative benchmark we make use of the EET model, justified by the economic considerations presented above compared with alternative normative models and its widespread, although partial, use across European countries. Moreover, in the experience of

European countries, even when a national government follows the legal approach in the measurement of pension-related tax expenditures, frequently it make use of the EET benchmark, because currently the EET is the structural model used to tax pensions.

In order to quantify the size of the TEs against the benchmark scenario, the literature makes use of four alternative budgetary approaches (Swift, 2006). The first approach is the *revenue foregone* approach, which provides an ex-post measure of the revenue lost due to the presence of tax expenditures, absent any change behavioural reaction from the taxpayers. 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 consists in estimating 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 programs. A fourth approach adopts explicitly a dynamic perspective by estimating the present value of the tax savings associated with the tax expenditure.

In order to analyse 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 increase in household disposable income) that is due to 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 if compared with the EET benchmark and configure themselves as negative tax expenditures, implying a loss in household disposable income. Due to lack of data, the fiscal treatment of accrued or realised investment incomes, which are mainly relevant for funded (private) pension systems and not for PAYG systems, is not considered in our empirical analysis. As a consequence, in what follows the EET benchmark boils down to counterfactual scenarios characterised by Exempted contributions and Taxed pension benefits (counterfactuals E-T). 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) phase of a pension system.[3]

2.3 Microsimulation approach, model and data

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

The use of a microsimulation approach based on national representative micro data provides a number of advantages over other methods, such as the use of nationally reported aggregate statistics, for comparing tax expenditures on a cross-country basis. First, one clear advantage of adopting a microsimulation approach in this respect is that the definition of the benchmark system against which TEs can be measured is made transparent. Second, a microsimulation model embeds the interaction between different tax instruments and benefits entitlement which is usually not considered in more aggregated approaches and can, in certain instance, greatly influence the final impact of tax reforms. Furthermore, the use of a tax-benefit model based on micro data rather than

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[3] The choice of a different benchmark would lead to different conclusions. See for example Collins and Hughes (2016) that analyse 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 characterised by Exempted contributions and Taxed pension benefits, the age related limits on deductibility of Superannuation contributions count as a negative tax expenditure and imply a net revenue gain. For sake of transparency, in the Annex we also report empirical evidence of the fiscal effects of pension-related TEs obtained when using counterfactuals characterised by Taxed contributions and Exempted pension benefits (counterfactuals T-E), which represent the most appropriate counterfactuals to describe the size of the pension-related TEs alternative tax treatments of contributions and pension benefits with respect to an income tax benchmark.

"model family" calculations for stylised households provides information on the policy effects 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 standardised cases. This feature differentiates our study from OECD (2016) in which the special tax regime for private pensions is compared with the tax regime of a benchmark saving vehicle for the average representative individual.

However, the multi-country comparative perspective - and the related complexity of modelling the pension-related tax expenditures together with all the other tax-benefits - forces us to adopt a static analysis approach that overlooks second round effects (Doerrenberg and Peichl, 2014). The potential disadvantages of this solution are mitigated by a number of considerations. First the greatest part of the pension-related tax expenditures adopted in European countries are actually targeted to elderly people that cannot react by changing their labour supply, prevented from it by labour demand, normative constraints and health and personal conditions. Consequently, we can reasonable conjecture that second round effects of tax expenditures if they exist should not be very important. Nevertheless, we exploit the flexibility of the microsimulation approach to extend the cross-sectional estimates along a lifetime perspective, borrowing a methodology developed in the generational accounting literature and presented in Section 4.3.

The simulations we are going to present are carried out using EUROMOD (Sutherland and Figari, 2013), which is the only comparative tax-benefit model available for all European countries. It has a unique design within which the different country specific tax-benefit systems are modelled in a common conceptual and technical framework, with the aim to maximise 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 socio-demographic characteristics from the underlying survey data. The model captures the full range of institutional features of tax and benefit systems in the EU countries. These include detailed income definitions (such as taxable income or "means" relevant for computing income-tested benefits), precise characterisation of family and assessment units, thresholds, floors, ceilings and relevant tax rates as well as specific eligibility rules, 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 (30th June). Tax-benefit policies are summarised 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-behavioural. Overall, the comparison of 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 reveal 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.

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[4] At the same time, due to lack of detailed information in the underlying data 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 (last accessed on March 15, 2018).

[6] For examples, see Immervoll et al. (2011), Dolls et al. (2012), Bargain et al. (2014).

[7] The prime examples of the EU-level policy analysis with EUROMOD are its regular use for the Social Situation Monitor (http://ec.europa.eu/social/main.jsp?catId=1049&- last accessed on March 15, 2018) and increasing occurrence in annual country assessments as part of the European Semester (http://ec.europa.eu/economy_finance/eu/index_en.htm - last accessed on March 15, 2018). In addition, EUROMOD has been applied in numerous policy analyses at the national level.

The version of EUROMOD used in this paper is based on information on personal and household characteristics (including market incomes) from the 2015 EU Statistics on Incomes and Living Conditions (EU-SILC) micro-data (or its more detailed national version where available8). EU-SILC is a nationally representative annual household survey collecting detailed information on income, labour, education and health in all European countries and being harmonised by EUROSTAT. Since 2010 EU-SILC data is being used for monitoring the poverty and social inclusion in the European Union. In this paper we use 2015 data, with sample sizes ranging from about 10-11 thousand individuals in Cyprus, Ireland, and Malta to more than 50 thousand persons in the UK. The simulations refer to the national tax and benefits rules as of 30th June 2017. To estimate the effect of tax expenditures we apply both the actual 2017 tax-benefit policies and the counterfactual scenarios without tax expenditure to the same households, keeping their characteristics (including market incomes) constant. Due 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 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 labour market outcomes). Finally, where relevant, some calibrations are adopted to take into account tax evasion (Greece, Italy) and non take-up of certain means-tested benefits (Estonia, Greece, Latvia, Romania, UK), assuming behaviour 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 European Union with large differences across countries. According to the widely accepted OECD taxonomy (OECD 2015)9, pension systems are organized into pillars and differentiate one from the other 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 the individual's working life. Its aim is to avoid poverty in the old age and its impact is highly redistributive. The second pillar is instead 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 of the countries. In most cases the contributions to the second pillar are mandatory for workers. The third pillar is voluntary and tries to address individual preferences for retirement savings versus alternative forms of savings.

The different pension schemes are one of the elements of the "ideal types of institutional structures" identified by Korpi and Palme (1998) in their welfare state typology. Focussing 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 of the European countries. The voluntary-subsidized model was in many European countries the precursor to the corporatist model inspired by Bismarck, where social insurance is compulsory, even though still organised along occupational lines. The basic security model resembles the original Beveridge design, with more comprehensive flat-rate benefits and low ceilings on earning-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

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[8] The micro-data used for the UK come from the Family Resource Survey.
[9] Alternative taxonomies group pension schemes according to their public or private nature but these can be misleading in a cross country perspective.

basic pensions combined with earnings-related benefits for the economically active population. In order to conceptualise the empirical analysis presented in the paper, the three relevant dimensions of pension systems are: the contribution rates, the replacement rates and the tax expenditures in the accumulation and decumulation phases. [10] Figure 1 presents a scatter of the contribution rates and the net replacement rates related to old-age mandatory pension schemes. Overall contribution rates (i.e. paid by employers and employees), expressed as % of total labour costs, range from 0 in Denmark to 37% in Hungary. Most of other countries show contribution rates between 15% and 35%. The main exception is represented by Ireland with a lower contribution rate. The Netherlands is the country in which the net replacement rate is the highest and close to 100% of the pre-retirement earnings. Austria, Hungary, Italy, Luxembourg and Portugal are above the 88%. Slovakia, Spain and Denmark around or slightly above 80%. All the other countries lie between 50% and 75%. Finally, the UK, Poland and Ireland stand for their low replacement rates, ranging between 29% and 42%. Unsurprisingly contributions are strictly correlated with net replacement rates notwithstanding a substantial degree of heterogeneity.

Figure 1. Contribution rates and net replacement rates in EU countries, 2017
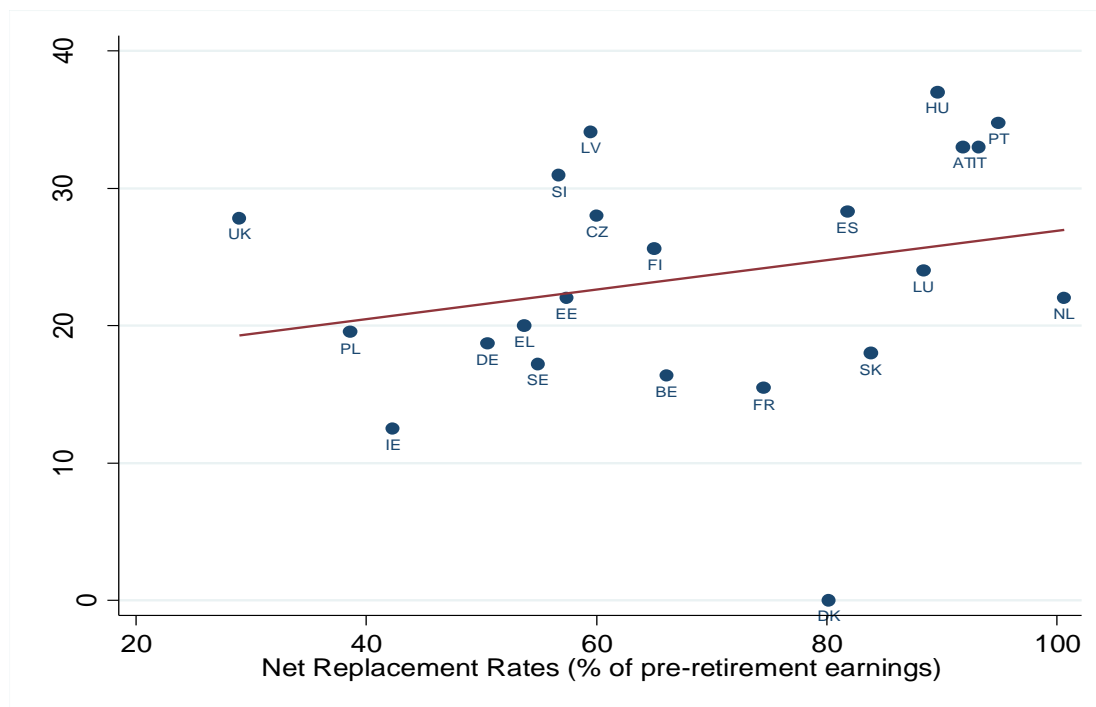
Notes: Contribution rates sum up the rates paid by employers and employees and refer to mandatory old-age pension schemes only. The net replacement rate is defined as the individual net pension entitlement divided by net pre-retirement earnings, taking account of personal income taxes and social security contributions paid by workers and pensioners. R-squared: 0.06
Sources: Contribution rates from EUROMOD country reports based on national legislation (https://www.euromod.ac.uk/using-euromod/country-reports). Replacement rates from Pension at a Glance, OECD.stat (2017), accessed on 5 February 2018. Missing information for Croatia, Cyprus, Lithuania, Malta, Bulgaria, Romania and Latvia.

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

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 of the pillars and the taxation regimes in place in each country which strongly affect the net replacement rates.

In line with what observed for contributions and replacement rates, high heterogeneity is also found for the tax-treatment of pension contributions and pension benefits. The most common system taxes both II and III pillar pensions and follows the so-called EET approach[11]. However, there are several exceptions and country-specific features that give right to pension-related tax expenditures.[12] This is the case in particular when social insurance contributions for pension schemes are taxed (fully or partially) or pensions are exempted, fully or partially, by means of extra allowances and credits or reduced tax rates. In fact, a tax treatment purely consistent with the E(E)T benchmark is applied only in Denmark and Poland for the II pillar and in the Netherlands and the UK for the III pillar. In all other countries, important exceptions and country-specific features in the tax treatment of pension incomes both in the accumulation and the decumulation phases, as shown in the Table A.1 in the annex, mark a departure from the E(E)T benchmark and are treated as pension-related tax expenditures.

In 20 countries out of 28 the contributions to the II pillar are exempted by means of full deduction from the taxable base of the personal income tax. In Portugal and Sweden the tax relief may exceed the value of a standard deduction because in Portugal contributions deductibility is subject to a minimum threshold and in Sweden contributions are fully credited against tax liability. In other countries the deductibility is either limited in terms of amount (Germany and Ireland) or category of pensions (the UK where contributions to State Pensions are not deducted). Three of the Eastern European countries (Czech Republic, Hungary and Lithuania) are characterised for contributions being fully taxed.

Pension benefits from the II pillar are fully taxed as part of the personal income tax only in Denmark and in Poland, and in Greece are subject to an extra tax in the form of a solidarity contribution. In 22 countries pension benefits are entitled to a lower tax treatment either in the form of tax allowance, tax credit or exemption of some benefits for the income tax base. In three of the Eastern European countries (Bulgaria, Lithuania and Slovakia) pension benefits are exempt from taxation. Notably, in Bulgaria and Slovakia also contributions are deducted so that pensions are not taxed neither in the accumulation nor in the decumulation phase.

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

As for III pillar pension benefits, in 16 countries they are regularly taxed as part of the personal income tax; in Estonia, Greece and Italy they are subject to lower tax rate, in Germany and Luxembourg they are partly exempted while in Bulgaria, Croatia, Hungary, Latvia and Portugal they are fully exempted 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

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[11] Overall pensions from the first pillar are generally not subject to income tax or their amount is below the level of the no-tax area and for this reason the fiscal treatment of the pensions from the first pillar is ignored in our empirical analysis.

[12] Since 2013 a number of reforms to pension-related tax expenditures occurred included the abolition of tax reliefs to pension benefits (e.g. Old age asset allowance in the Netherlands, Regional tax credit related to age in Illes Ballears (Spain), Seniority allowance in Slovenia and Age allowance in the UK) and to contributions to the III pillar schemes (e.g. tax reliefs abolished in Sweden and Slovakia).

income (OECD, 2015). Nevertheless, the bulk of income in old age in all countries is represented by II pillar pensions, ranging from 40-50% of disposable income for the elderly population in Ireland and the UK to more than 85% in the majority of countries. In countries adopting the basic security model (such as Denmark, Sweden, the UK, Ireland and the Netherlands), the share of disposable income deriving from II pillar benefits shows a decreasing pattern across income deciles. The same pattern characterises the Eastern European countries. On the other hand, in countries featuring strong 'Bismarckian' earnings-related schemes (e.g. Austria, France, Germany and the southern European countries), II pillar pensions are distributed more towards the upper end of the income scale than the lower end. In most of the European countries, III pillar pensions are virtually non-existent (though it is possible that they are misrecorded as capital income by the original surveys in some cases). The main exceptions are Denmark and the UK where the private pensions represent respectively 19% and 30% of the disposable income of elderly.

4   Empirical evidence

Exploiting the microsimulation approach presented above, we compare tax regimes currently in place in each Member State (i.e. baseline scenario) with counterfactual scenarios consistent with the E(E)T benchmark. The results are exposed and analysed in order to highlight specificities and common patterns across EU countries for what concerns the size of the pension-related tax expenditures and their distributional impact across cohorts and income groups. Moreover, in line with the social and economic goals recognised to the tax expenditures, their impact is related to their poverty reduction effectiveness and the diffusion of III pillar pensions.

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 and it represents a substantial share of revenue in most of them. For a great majority of the 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 the presence of negative pension-related tax expenditures determines instead an extra revenue up to 13% as in case of Greece.[13] As described above, we analyse separately the TEs related to the second and third pillar pensions schemes as defined by the OECD taxonomy and related to the accumulation and decumulation phases.

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[13] Table A4 in the annex reports the pension-related tax expenditures expressed as % of old-age pension benefit expenditure. They represent more than 10% of old-age pension benefit expenditure in Bulgaria, Estonia, Latvia, Lithuania, Portugal, Romania, and Sweden.

Figure 2. Revenue cost of pension-related tax expenditures, 2017
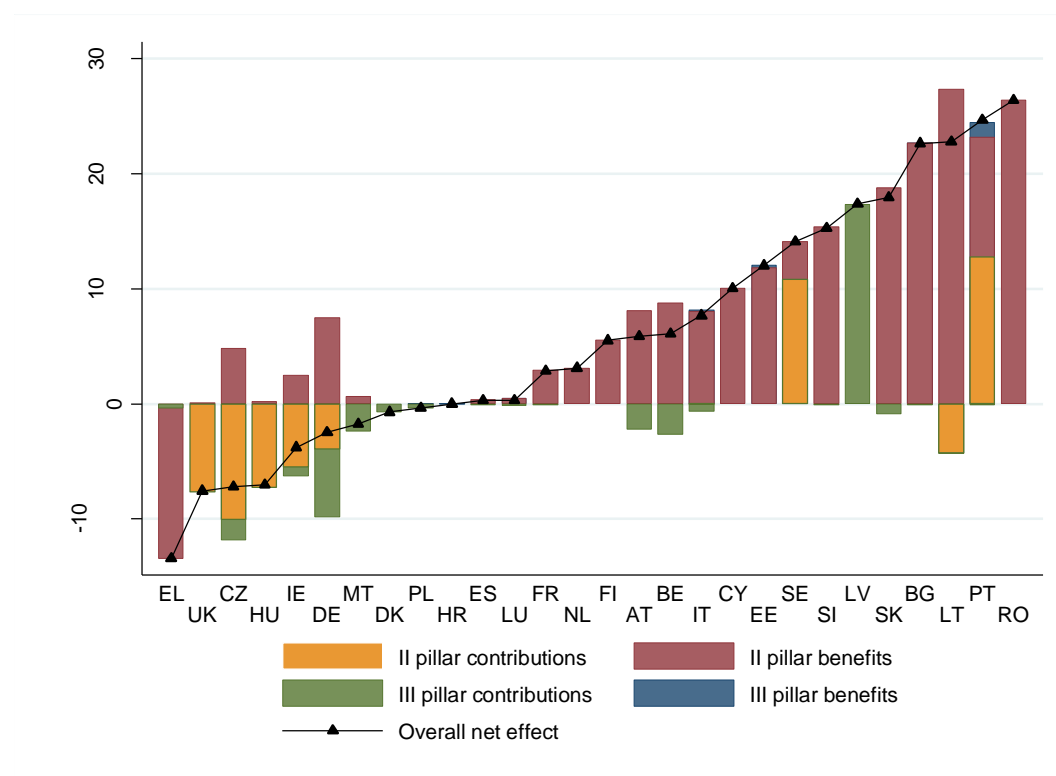
Source: authors' simulations with EUROMOD H0.34.

Focusing on the fiscal treatment of the II pillar pension benefits, the revenue cost observed in most of the countries is due to the existing exemption of pensions from income tax (Lithuania, Bulgaria and Slovakia) and the presence of specific tax reliefs related to pension incomes in the other countries (red bar in Figure 2). The cost, expressed as % 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 represented by Greece where pension incomes are subject to an extra levy in the form of pensioner's solidarity contributions which determine an increase in the tax revenue of about 13%. Such extra levy has been implemented as part of the fiscal consolidation measures, dictated by the international Troika of donors (the European Union, the European Central Bank and the International Monetary Fund) after the onset of the Great Recession (Matsaganis and Leventi, 2014). Due to the relative limited spread of the III pillar schemes across Europe, the budgetary effects of tax reliefs applied on III pillar pension benefits is negligible and somehow relevant only in Portugal (blue bar) where benefits are exempted from income tax.

The baseline tax regime includes some negative tax expenditures which are a way to collect extra revenue, if compared with the E(E)T benchmark. More specifically, social insurance contributions related to II pillar are not fully deducted from the taxable income in Czech Republic, UK (for State Pension), Hungary, Ireland, Germany, and Lithuania (orange bar). III pillar pension contributions are not deductible or deductible with limits in a number of countries with a somehow relevant budgetary effect in Czech Republic, Germany, Austria, Belgium and Malta (green bar).

Sweden and Portugal stand for their tax treatment of II 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 revenue respectively (orange).

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

4.2 The distributional effects of pension-related tax expenditures

As expected the correlation between revenue cost of pension-related TEs and their impact on income inequality is (-0.32, significant at 10% level). Pension-related tax expenditures determine a lower level of inequality of the overall income distribution in most of the countries 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).

Figure 3. Impact on inequality of pension-related tax expenditures, 2017
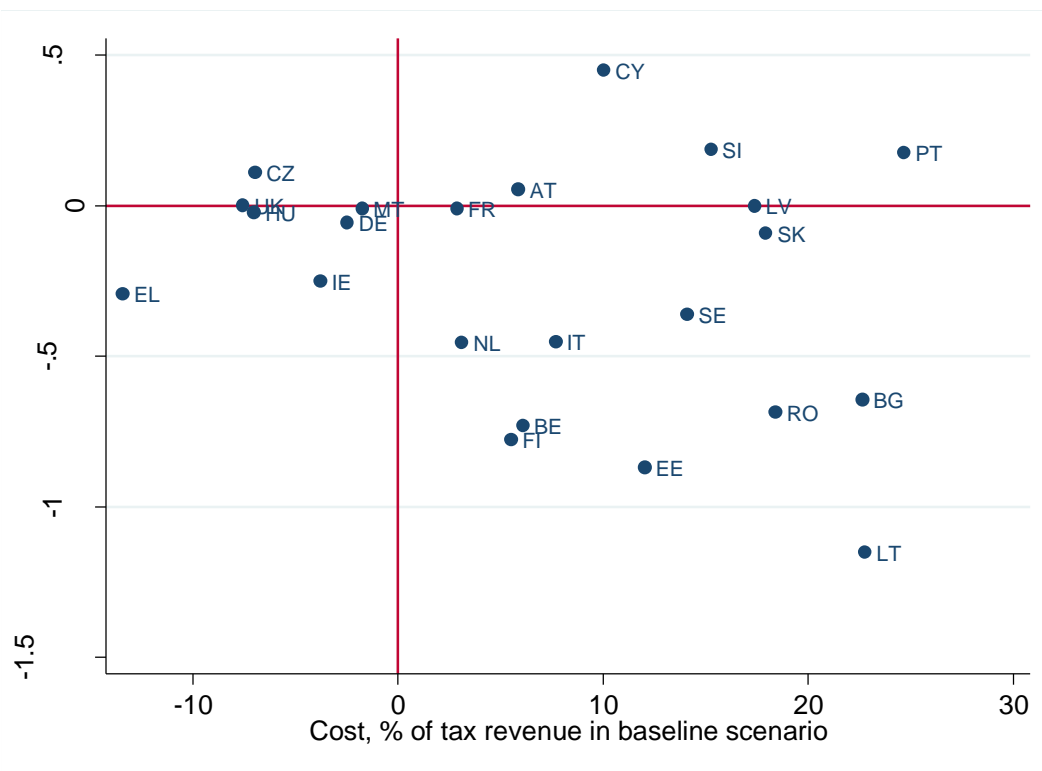
Note: Croatia, Denmark, Luxembourg, Poland and Spain show a cost of pension-related tax expenditures, as % of tax revenue in baseline scenario, close to 0 and are not included in the Figure. Source: authors' simulations with EUROMOD H0.34.

The average relative decrease in Gini index observed in our simulations is slightly above what observed by Doerrenberg and Peichl (2014) for the effect of public social expenditures. Indeed, they find that 1% increases in government spending and public social expenditure are roughly related to 0.3% and 0.2%, respectively, drops in inequality. Focusing on countries where tax expenditures represent a net cost for the government budget we do observe that a 1% increase in tax revenue is, on average, related to a 0.5% reduction in inequality. These results reveal that tax expenditures are more targeted than overall public spending resulting in a more effective reduction of inequality.

In addition, the same target of reduction of the inequality is reached in different countries with a very different use of resources. In some countries in which tax expenditures are negative, it is anyway observed a reduction in inequality. This evidence suggests that tax expenditures in these countries represent a cost that mostly falls 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 tax revenue to the almost 0 percentage points of reduction in Gini index observed in Portugal in view of tax expenditures that reach 25% of tax revenue.

As expected by tax instruments which overall treat in a favourable way pension benefits while 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 equivalised disposable income by age groups, Figure 4 shows the extent to which pension- related tax expenditures favour pensioners versus working age population even within the same country. Pensioners gain from tax expenditures more than 5% of their income in Austria, Belgium, Bulgaria, Estonia, Finland, Germany, Italy, Latvia, Lithuania, Netherlands, Portugal, Romania, Sweden, Slovakia and Slovenia. Notably, in Austria, Belgium, Czech Republic, Germany, Ireland and Malta young generations do not only receive less than older generations, but even bear a net cost due to the presence of negative tax expenditures. In Greece, Hungary and the UK, the presence of negative TEs implies a negative effect on disposable income for all generations.

The distribution of tax expenditures by age groups could offer interesting insights into the political economy literature on the relationship between population ageing and the generosity of the social security system. In particular, Galasso and Profeta (2002) and Disney (2007) find that, according to stylized median voter theorem, an increasing dependency rate should determine an increase in the pension benefits and contributions. Our estimates could provide further evidence relating the dependency ratio and the generosity of tax expenditures in favour of the elderly.

Further insights in the changes in the overall inequality of the income distribution can be traced by looking at the variation in the equivalised disposable income by decile of income groups (see Figure 5). The graphs within Figure 5 are drawn on different scale across countries, but in a large number of countries the variation of disposable income is above 2% of the income in the respective 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 their incidence on disposable income is flat or characterised by an inverted U-shape in Austria, Portugal, Slovakia, Sweden. In all countries where TEs implies a net gain in aggregate revenue this comes mostly from individuals in the top part of the distribution with an overall progressive impact due to the richest individuals paying more taxes.

In Figure 5 the change in disposable income by decile groups is further decomposed by three different types of households: working age, pensioner and multigenerational households where

working age and pensioner individuals cohabit14. Across countries, pensioners take advantage of pension-related tax expenditures (mainly through tax reliefs on pension incomes), with a stronger positive impact on the disposable income in the lower-middle part of the income distribution. By contrast working age households, in particular in 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 produce a net gain in terms of revenue, but also in Austria and Germany.

These results suggest that overall the pension-related tax expenditures can be progressive at two levels: first among pensioners, by favouring lower income pensioners (mainly through a favourable 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 addressed to pension benefits are normally driven by redistributive aims. To provide some descriptive insights on the effectiveness of the tax expenditures currently in place in targeting these goals, we show the correlation between the revenue cost and the elderly poverty reduction with respect to the baseline scenario (Figure 6).

From Figure 6 it is clear that tax expenditures related to pension benefits determine a significant reduction in the elderly poverty rates (from 2 to 15 percentage points) in the vast majority of the 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 22% in elderly poverty rates. Such a correlation is relevant if compared to a reduction of about 30% for each percentage point of disposable income received from I pillar pensions, given their anti-poverty role and targeting (Figari et al. 2013). Nevertheless, in a large number of countries the relation between cost and poverty reduction effectiveness is much less strong with relevant budgetary amounts not clearly linked to poverty reduction. In the countries where pension benefits are subject to higher tax than in the benchmark namely Greece and Czech Republic, the tax expenditures which represent an overall gain in tax revenue do not to affect elderly poverty rates, confirming that their burden is mainly imposed on rich pensioners.

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

Figure 4. Change in disposable income by age group due to pension-related tax expenditures, 2017
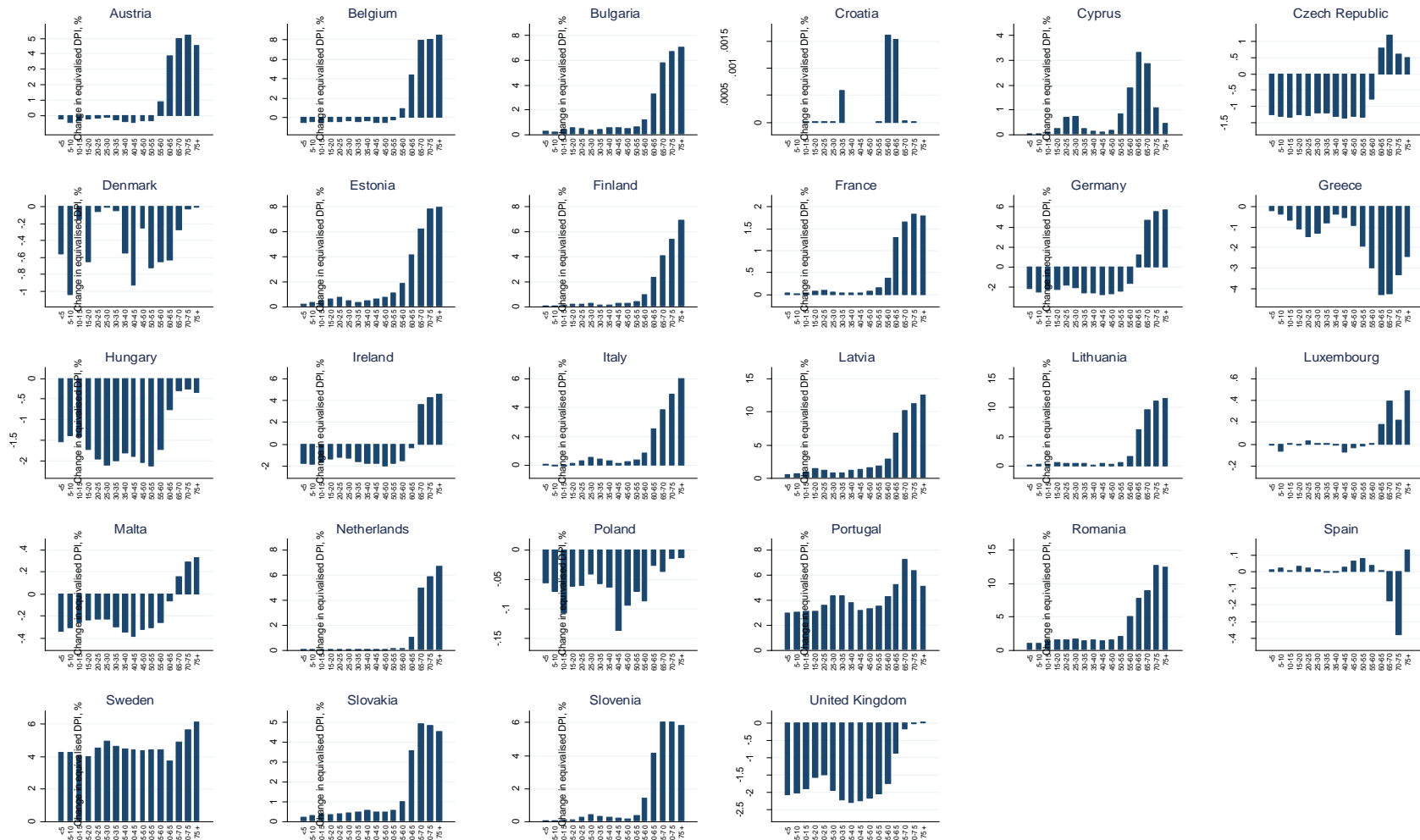
Notes: Change in equivalised disposable income (DPI) for individuals grouped in 16 age groups. Income equivalised using the OECD modified equivalence scale. Different scales across countries. Source: authors' simulations with EUROMOD H0.34.

Figure 5. Change in disposable income decomposed by household types and decile groups due to pension-related tax expenditures, 2017
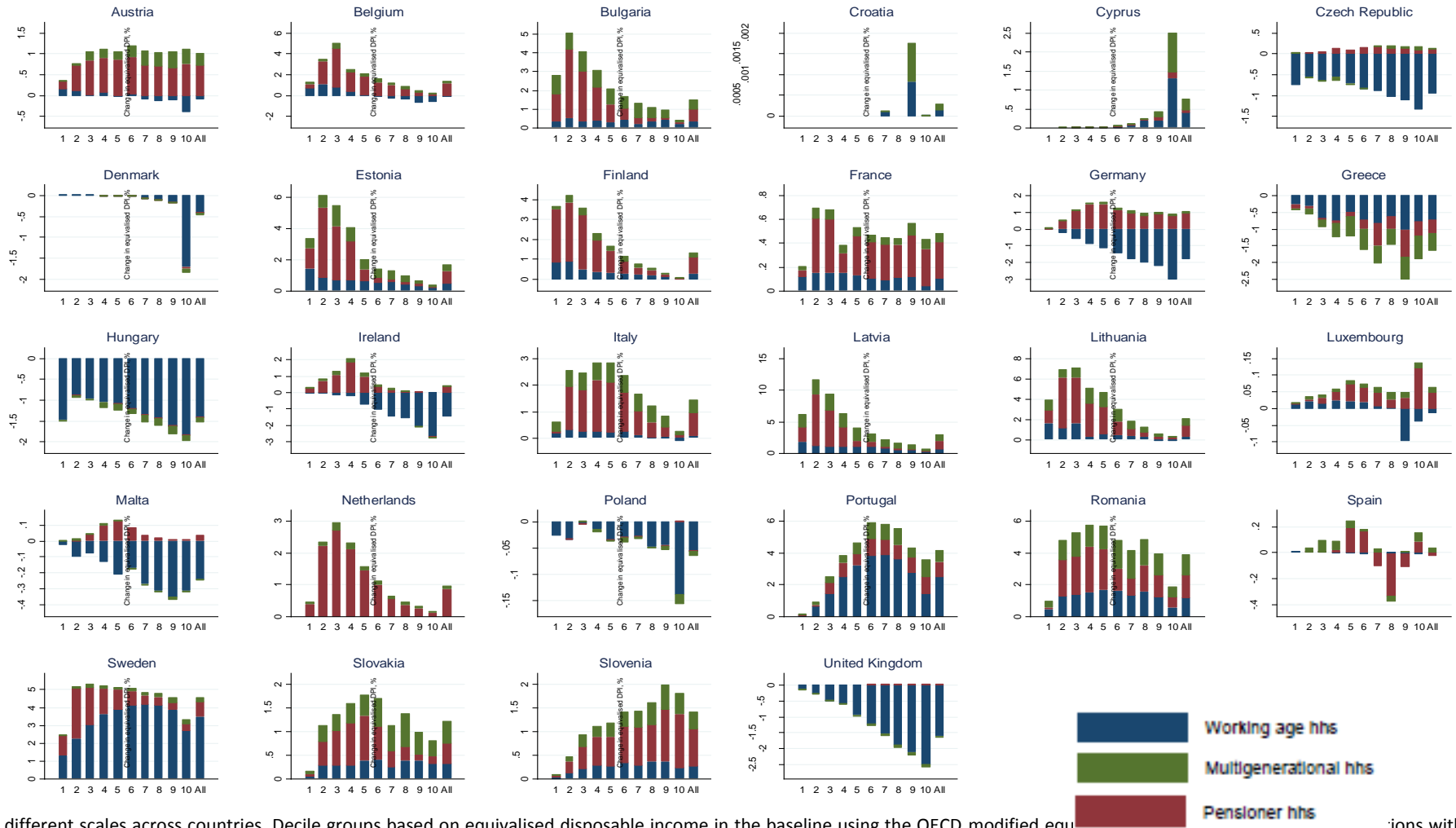
Notes: different scales across countries. Decile groups based on equivalised disposable income in the baseline using the OECD modified equ⬛⬛⬛⬛⬛⬛⬛⬛⬛:ions with EUROMOD H0.34.

Figure 6. The effectiveness of tax expenditures on pension benefits in addressing elderly poverty rates, 2017
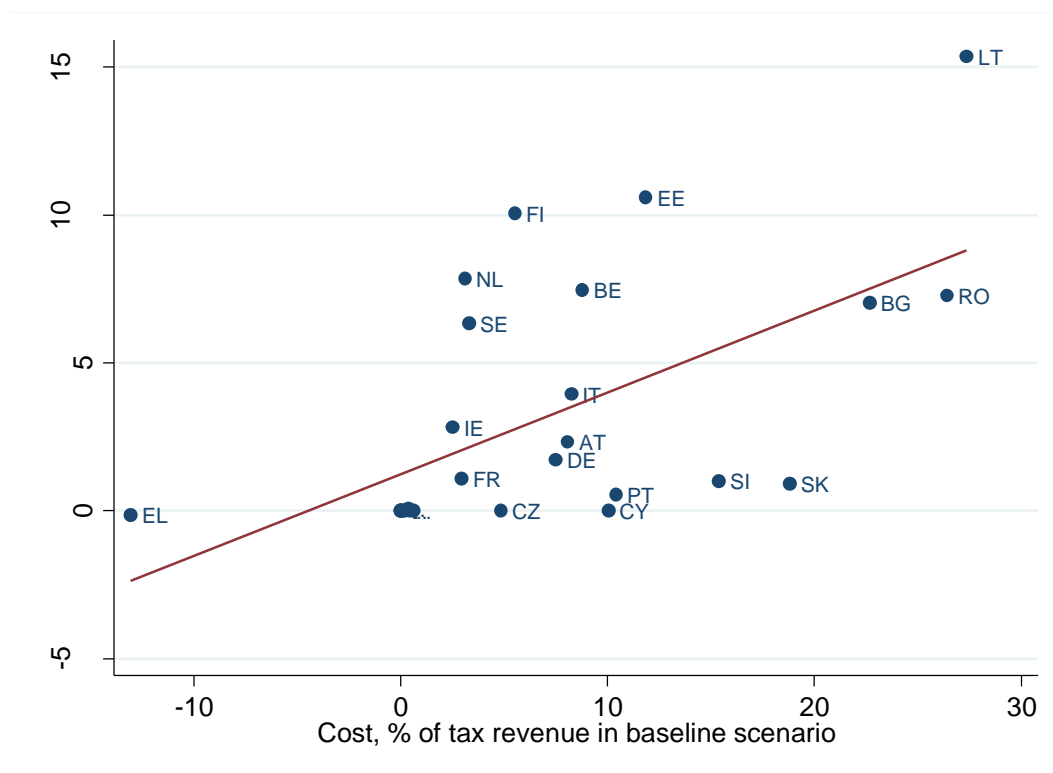
Notes: Croatia, Denmark, Hungary, Luxembourg, Latvia, Malta, Poland, Spain, and the UK show a cost of tax expenditures on pension benefits, as % of tax revenue in baseline scenario, around 0 and are not labelled in the Figure. R-squared: 0.35. Source: authors' simulations with EUROMOD H0.34.

4.3 Pension-related tax expenditures over the life-cycle

The ideal setting to analyse the size and the effects of pension related tax expenditures would imply a lifetime perspective (Feher and Jousten, 2018), following each individual from the working age to the retirement and calculating the present value of the tax expenditures faced over the life cycle. However, such a setting would require a dynamic microsimulation model for each single country, able to simulate along life, year by year, for each individual, labour market transitions, career profile, contributions, maturation of pension rights and pension benefits. The design and the realization of such dynamic microsimulation models are very complex and time demanding and not many EU countries have one. In addition, these models require strong assumptions about the evolution of the pension and taxation rules along a very long life-time period, making the whole approach potentially poorly reliable in particular in a cross-country perspective. At national level, existing studies have normally a narrower scope than the one of this paper and they focus only on the redistributive effects on 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 along a lifetime perspective, borrowing a methodology developed in the generational accounting literature (Auerbach et al. 1994) and adapted by Ter Rele (2007) in order to measure, in terms of present values, the redistributive effects of the tax-benefit system over the entire life cycle for average representative individuals. In our case, we start by building the average age profile of pension-related tax expenditures by gender and educational level in year 2017 (the time t of our cross-sectional analysis). That is, we partition the population into 3 education groups (high, medium and low educated) and then by gender (males and females) and for each subgroup we compute the average amount of TEs at the age of 25, 26 ...80 years:

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

Starting from these cross sectional age profiles, as in the generational accounts literature, we assume a given level g of the nominal GDP growth rate and, for each educational and gender groups, we approximate the cohort age profile of TEs for a 25 years old individual as:

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

....

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

Implicitly, we assume that the average individual that we currently observe at the age of 25, in one year, when he will be 26 years old, will face the pension-related tax expenditures observed for the average individual that is currently 26 years old, only augmented for the economic growth. The whole estimation assumes invariance in the demographic composition and socio-economic 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 relies in its transparency and relative simplicity, which makes it feasible in 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:

$$VA\_TEs_{t,age=25} = \sum_{i=0}^{(80-25)} TEs_{t,age=25+i}\left(\frac{1+g}{1+r}\right)^i l_{age=(25+i)}$$

where lage=(25+i) is the probability for the average individual alive when 25 years old to be alive at the age (25+i) assumed to be equal to 1. The present values presented in the paper are computed assuming a discount rate of 2% and a GDP nominal growth rate equal to 1.3% corresponding to the EU potential average GDP annual growth rate for the EU projected for 2016-2070 (European Commission, 2017). This approach 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 along their entire lifetime. Figure 7 shows the present value of the pension related tax expenditures by gender and education, defined as in the cross-sectional analysis against a E(E)T benchmark tax system. 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. The results can be divided in two groups and show a pattern consistent with the evidence reported in the cross-section 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 female and low educated individuals. This is consistent with the fact that such tax expenditures are mainly channelled through tax reliefs associated to the II pillar benefits, with a clear redistributive effects toward the bottom part 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 in particular for the high educated individuals. This is consistent with the fact that such tax expenditures are mainly channelled through taxation of pension contributions, with higher burden for those with higher earnings. The pattern of the present value is consistent with the evidence reported in the cross-section analysis and across countries it is interesting to note the different level of tax expenditures. For low educated females, for example, the present value of tax expenditures ranges from less than 1% of gross income in France, Spain and Ireland to almost 3% in Italy, Finland, Belgium and The Netherlands. In Latvia, Lithuania, Romania and Sweden it reaches more than 5%.

Figure 7. Life cycle present value of pension-related tax expenditures
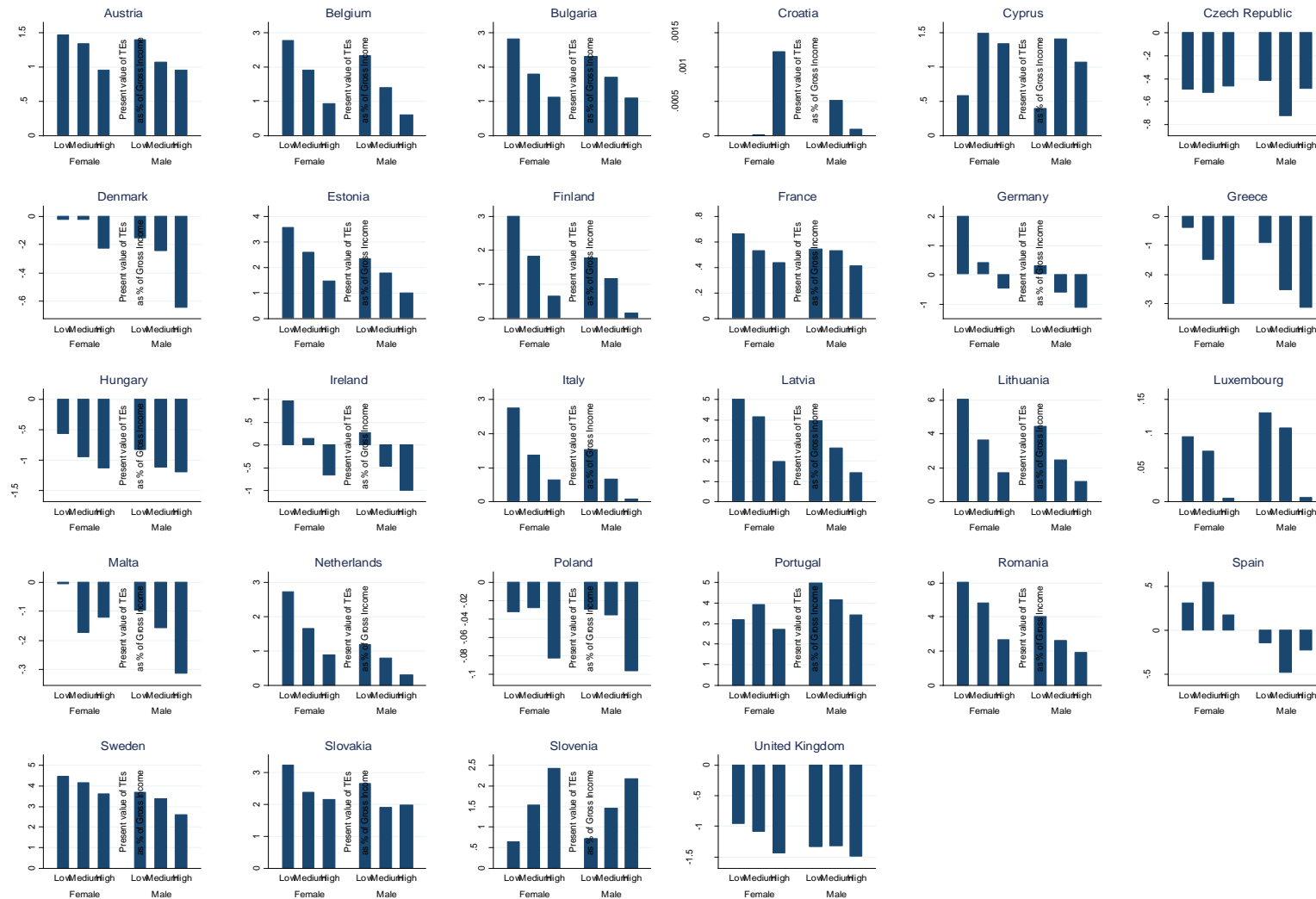
Notes: different scales across countries. Discount rate set at 2% and GDP nominal growth set at 1.3%. Source: authors' simulations with EUROMOD H0.34.

5 Conclusions

Regardless the wide use of tax expenditures across European countries, governments put since now little effort to investigate their real weight in their public budget and, above all, their effective fiscal and equity impact. Nevertheless, such an evaluation is worthwhile, especially in the present context of constrained public finances. This paper is the first attempt to provide a cross-country comparable quantification of the fiscal and equity impact of pension-related tax expenditures that in some circumstances can effectively substitute for social policy programs. We make use of a microsimulation approach, using the EU-wide microsimulation model EUROMOD, in order to evaluate how tax expenditures interact with the broader provisions of the tax-benefit systems across the European countries. 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 available empirical evidence outside Europe, the pension-related tax expenditures tend to be progressive at two levels: first among pensioners, by favoring lower income elderly (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.

The current economic downturn has seriously aggravated the underlying challenges posed by ageing and more needs to be done to improve the efficiency of the pension schemes across Europe (European Commission, 2010). The capacity of the pension systems to guarantee their adequacy and sustainability will also depend on their interaction with the overall tax-benefit system. The role of tax expenditures, which are particular effective in decreasing overall inequality and elderly poverty rates, will become even more relevant in the future with more of the financial risk being borne by private individual pension plans and reduced redistribution in favour of lower income individuals through the public pension systems. Projections show that, by 2050 more than 30% of those aged over 75 will be at risk of poverty in most European countries (Zaidi et al., 2006), compared to a European average of 20% in the 2009.

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

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Annex

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

Country	II Pillar		III 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 info 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 the amount above 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

Country	II Pillar		III Pillar	
	Contributions	**Benefits**	**Contributions**	**Benefits**
Finland	**Exempt**	**Partially taxed** • Pensioner's 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 "abattement")	**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 +** • Pensioner's (and additional) solidarity contribution	**Taxed** • Contributions not deducted	**Partially taxed** • Pensions taxed at a lower rate
Hungary	**Taxed** • Contributions not deducted	**Partially taxed** • Survivors 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**

Country	II Pillar		III Pillar	
	Contributions	Benefits	Contributions	Benefits
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** • Survivors 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 info available**	**No info available**
Spain	**Exempt**	**Partially taxed** • Personal Tax Credit, complement for elderly • Employment Income Tax Allowance Supplement for elderly • Regional tax credits related to age (Canarias, 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**

Country	II Pillar		III Pillar	
	Contributions	Benefits	Contributions	Benefits
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 • Pensioner 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 which 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 reflects also the classification of EU-SILC variables. In some countries variables related to the II pillar might include components of the I pillar as well (i.e. integration of public pensions to the minimum amount). Variables related to the III 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 share of contributions devoted to the financing of the State Pension. We computed the State Pension expenditure as a proportion of total expenditure of insurance-based benefits from the DWP Expenditure and Caseload forecasts (Spring 2017 edition) and then we considered only that proportion (i.e. 91.6% as of 2016/17 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, % of tax revenue in baseline

scenario, 2017 - Benchmark system: E-T

Country	II pillar contributions	III pillar contributions	II pillar benefits	III pillar benefits	Total
	a	b	c	d	e
EL	0.00	-0.37	-13.06	0.00	-13.43
UK	-7.63	0.00	0.07	0.00	-7.56
CZ	-10.01	-1.80	4.84	0.00	-6.97
HU	-7.24	0.00	0.21	0.00	-7.03
IE	-5.51	-0.75	2.51	0.00	-3.75
DE	-3.96	-5.93	7.49	0.00	-2.40
MT	0.00	-2.39	0.66	0.00	-1.73
DK	0.00	-0.71	0.00	0.00	-0.71
PL	0.00	-0.36	0.00	0.01	-0.35
HR	0.00	0.00	0.00	0.01	0.01
ES	0.00	-0.08	0.37	0.00	0.30
LU	0.00	-0.18	0.47	0.03	0.32
FR	0.00	-0.07	2.95	0.00	2.89
NL	0.00	0.00	3.11	0.00	3.11
FI	0.00	0.00	5.52	0.00	5.52
AT	0.00	-2.19	8.08	0.00	5.88
BE	0.00	-2.69	8.79	0.00	6.10
IT	0.00	-0.63	8.25	0.09	7.70
CY	0.00	0.00	10.05	0.00	10.05
EE	0.00	0.00	11.85	0.18	12.02
SE	10.81	0.00	3.30	0.00	14.11
SI	0.00	-0.09	15.38	0.00	15.29
LV	0.00	17.35	0.00	0.00	17.34
SK	0.00	-0.86	18.80	0.00	17.94
BG	0.00	-0.07	22.67	0.03	22.64
LT	-4.31	-0.04	27.36	0.00	23.02
PT	12.75	-0.05	10.41	1.29	24.40
RO	0.00	0.00	26.41	0.00	26.41

Note: The columns in the table (a-e) report the size of tax expenditures with respect to the E-T benchmark. The countries are ordered by increasing overall net effect of tax expenditures. A positive (negative) number refers to a revenue cost (gain) due to the presence of a tax expenditure. Reading guidelines: in case of Italy, column b shows a revenue gain of 0.63% of total tax revenue due to the contributions to III pillar deducted with limit (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 III pension benefits taxed at a lower rate (i.e. partial taxation). Column e shows the total net revenue cost of 7.7% of total tax revenue due to the existing tax related expenditures with respect to the E-T benchmark.

Table A3. Revenue cost of pension-related tax expenditures, % of tax revenue in baseline scenario, 2017 - Benchmark system: T-E

Country	II pillar contributions	III pillar contributions	II pillar benefits	III pillar benefits	Total
	f	g	h	i	l
EL	15.44	0.00	-30.48	0.00	-15.04
UK	0.00	4.44	0.00	-9.00	-4.56
CZ	0.00	0.28	0.00	-0.26	0.02
HU	0.00	0.00	-22.48	0.00	-22.48
IE	1.93	2.44	-2.24	-0.67	1.46
DE	8.28	0.00	-10.27	-0.34	-2.33
MT	16.94	0.00	-4.88	-0.43	11.63
DK	6.99	0.54	-11.21	-5.71	-9.39
PL	9.35	0.00	-25.31	0.00	-15.96
HR	59.40	0.02	-4.55	0.00	54.87
ES	8.26	1.48	-18.13	-3.46	-11.85
LU	13.47	1.44	-26.01	-0.03	-11.13
FR	10.09	0.45	-20.39	-0.04	-9.89
NL	7.84	1.96	-14.71	-0.14	-5.05
FI	4.22	0.39	-18.39	-2.03	-15.81
AT	18.05	0.00	-23.77	-2.01	-7.73
BE	15.43	0.00	-17.36	-0.27	-2.20
IT	15.24	1.13	-26.79	-0.09	-10.51
CY	11.83	0.19	-13.59	-0.59	-2.16
EE	1.83	0.47	-4.15	-0.19	-2.04
SE	18.54	0.00	-20.89	-2.05	-4.40
SI	32.11	0.89	-4.27	-0.10	28.63
LV	12.33	0.27	17.34	0.00	29.94
SK	12.63	0.00	-1.72	-0.05	10.86
BG	9.09	0.04	0.00	0.00	9.13
LT	0.00	0.13	0.00	-0.04	0.09
PT	0.00	0.00	-22.88	0.00	-22.88
RO	8.01	0.00	-4.53	0.00	3.48

Note: The columns in the table (f-l) report the size of tax expenditures with respect to the T-E benchmark. The countries are ordered by increasing overall net effect of tax expenditures with respect to the E-T benchmark (see Table A2). A positive (negative) number refers to a revenue cost (gain) due to the presence of a tax expenditure. Reading guidelines: in case of Italy, column f shows a revenue cost of 15.24% of total tax revenue due to the contributions to II pillar deducted (i.e. exemption); column g shows a revenue cost of 1.13% of total tax revenue due to the contributions to III pillar deducted with limits (i.e. partial exemption); column h shows a revenue gain of 26.79% of total tax revenue due to the II 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 III pillar pension benefits taxed, although at a lower rate (i.e. partial taxation). Column l shows the total net revenue gain of 10.51% of total tax revenue due to the existing tax related expenditures with respect to the T-E benchmark.

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

	Old-age pension benefits		Pension-related tax expenditures Benchmark system: E-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
United Kingdom	219,361.23	11.60	-14,148.45	-6.45

Note: a positive (negative) number refers to a revenue cost (gain).

Source: Old-age pension benefits expenditure taken from Eurostat (http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=spr_exp_nac&lang=en), accessed on 6 April 2018. Pension-related tax expenditures are authors' simulations with EUROMOD H0.34.

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