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Does going beyond income make a difference? Income *vs.* equivalent income in the EU over 2007-2011

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Abstract

In this paper, we study whether taking into account non-income dimensions along with income while measuring individual well-being matters for cross-country welfare comparisons. We focus on the 27 EU member states over the period 2007-2011, using data from the European Quality of Life Survey. Individual well-being is measured by equivalent income, which is equal to the actual income minus the monetary value of suffering from not having the best achievements in non-income dimensions. Cross-country comparisons of these statistics and their growth rates show that going "beyond income" makes a substantial difference. In particular, we find that when social welfare is measured by an index sensitive to both mean well-being and its inequality, leaving out non-income dimensions, especially health, from well-being measurement, would leave unexplained more than half of the cross-country variation in social welfare. Taking non-income dimensions into account affects more the part of social welfare that is inequality-sensitive than the one that is mean sensitive.

Keywords: well-being, multi-dimensional, equivalent income, social welfare, non-income dimensions

1 INTRODUCTION

Improving social welfare – providing better lives for citizens – is a proclaimed, if not always achieved, objective of any society. Mainly due to practical purposes, social welfare has been for long dominantly identified with some measure of aggregate national output or income. Gross domestic product (GDP) per capita is still predominantly used as a measure of countries' overall welfare. This comes from the commitment to the idea that income creates real opportunities for a good life. The importance of non-income dimensions, is acknowledged only indirectly. Another feature of the dominant approach in measuring social welfare is that the distribution of social welfare has been relatively neglected, at least until recently. This is best reflected in the high importance attached to the efficiency aspect of social welfare relative to its equity aspect.

The recognition of excessive focus on income has been around at least since Sen (1985). He conceptualised well-being of a person as the extent of her "capabilities", meaning her real freedom to achieve "functionings" that she reasonably values. Effectively, this amounted to recognising multi-dimensionality of individual well-being and the need to measure it directly, rather than assuming that higher income will generate a larger set of functionings. Based on these ideas, the United Nation Development Programme (UNDP) created a Human Development Index (HDI) that consists of three dimensions: GDP per capita, literacy and longevity. Recently, the recognition that well-being is multi-dimensional and should be measured accordingly has gained momentum, largely due to the influential Stiglitz-Sen-Fitoussi Report (Stiglitz, Sen and Fitoussi, 2009). They criticise the "GDP approach" and accordingly they recommend going beyond it (Stiglitz, Sen and Fitoussi, 2010). The Organization for Economic Cooperation and Development (OECD) also recognizes

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the multi-dimensional notion of well-being. Operationalising one of the organisation's "key priorities", namely to measure quality of life and monitor broader notions of social progress, in 2011 the OECD launched the "Better Life Initiative" (OECD, 2011). The importance of accepting multi-dimensional well-being has been recognized as well by the European Commission, which in 2009 issued the communication "GDP and Beyond", and took steps to collect data for the construction of a multi-dimensional measure (ESS, 2011). This issue has thus reached the European political agenda (Bache, 2013).

In this paper, we go beyond income in assessing well-being in 27 European Union (EU) member states[1] over 2007-2011.[2] We ask whether the way in which well-being is measured makes any difference for cross-country well-being comparisons. To do so, we start from the individual, rather than the societal level. We use individual data from a wide European survey to construct, for each individual in a given country and year, a multi-dimensional well-being measure combining income with five non-income dimensions: health, unemployment, housing quality, crime and environmental quality. We also go beyond the mean, by assessing well-being inequality along with its mean level.

The multi-dimensional well-being measure that we use is *equivalent income*. It is defined and discussed in a number of papers, but here we refer to the most recent and detailed papers of Decancq, Fleurbaeyn and Schokkaert (2015a; 2015b) and Fleurbaey (2015). For a person with some income and non-income dimensions, equivalent income is the hypothetical amount of income which, when combined with the best (most preferred) levels of all non-income dimensions, gives this person the same utility as her actual income and her actual achieved levels of non-income dimensions. The relative weights assigned to income and non-income dimensions are not arbitrary (e.g., equal weights) but rather derived from preferences of the population. We estimate preferences using a model of life satisfaction. Precisely, a life satisfaction score is regressed on income and non-income dimensions, controlling for other correlates of life satisfaction. In doing so, we estimate the preferences held by what we could term a "representative EU citizen", where "representative" refers to the fact that preferences are homogeneous and estimated on a sample representative of the EU population.

Although subjective well-being scores are used to construct it, equivalent income is a non-welfarist measure with cardinal properties and it is directly comparable to income. Thus, the whole toolkit of distributional analysis can be applied to income and equivalent income alike, enabling comparisons of various indicators based on incomes with those based on equivalent incomes.

[1] Countries (abbreviations) are: Austria (AT), Belgium (BE), Bulgaria (BG), Cyprus (CY), Czech Republic (CZ), Germany (DE), Denmark (DK), Estonia (EE), Greece (EL), Spain (ES), Finland (FI), France (FR), Hungary (HU), Ireland (IE), Italy (IT), Lithuania (LT), Luxembourg (LU), Latvia (LV), Malta (MT), Netherlands (NL), Poland (PL), Portugal (PT), Romania (RO), Sweden (SE), Slovenia (SI), Slovakia (SK), United Kingdom (UK). The abbreviations will be used in figures throughout the paper.

[2] Of the current EU member states, only Croatia is left out, as it was not yet a member state during in this period.

Equivalent income has been used in a number of papers so far, both for single- and multi-country analyses. In an analysis based on Russian longitudinal survey data, Decancq, Fleurbaeyn and Schokkaert (2015a) compared equivalent income to a uni-dimensional monetary measure (expenditures *per capita*), life satisfaction and an objective multi-dimensional measure. They found that the identification of the worst off depends on the well-being measure used. Decancq and Neumann (2016) and Decancq, Schokkaert and Zuluaga (2016) reached similar conclusions with German and Columbian data, respectively. Decancq, Fleurbaeyn and Schokkaert (2017) examined different sources of equivalent income inequality in Russia and found that a large part can be explained by preference heterogeneity. Using data on Flemish adults, Defloor, Verhofstadt and Van Ootegem (2017) explored the robustness of equivalent income to the type of subjective well-being data used for preference estimation, and concluded that while the overall ranking of individuals is quite robust, there are certain differences in the profiles of the worst off. Jara and Schokkaert (2016) exploited Swedish EU-SILC data and the microsimulation model EUROMOD to show that *ex-ante* policy evaluations may benefit from using equivalent income as a richer well-being measure compared to disposable income. A couple of papers focused on health-related applications. Fleurbaey et al. (2012) and Schokkaert et al. (2013), using data from a French survey, proposed using equivalent income as an approach to assess socio-economic (income-related) equity in health, showing that it is feasible and that it may be normatively more appealing than the traditional approach based on a concentration index of health (or health care) with respect to income. In another application to health, Samson et al. (2017) showed that it is feasible to use equivalent income in a distribution-sensitive cost-benefit analysis, as an alternative to the traditional cost-effectiveness analyses in health technology assessments.

There are also multi-country studies. Fleurbaey and Gaulier (2009) estimated average equivalent incomes for 24 OECD countries based on macro data and found that the ranking of countries by this measure is considerably different from the ranking by GDP *per capita*. With micro data for 13 countries and macro data for 152 countries, Jones and Klenow (2017) conclude that although the average equivalent income is highly correlated with GDP *per capita*, there are substantial deviations between the two. The dispersion of well-being among the developed countries is smaller than according to GDP *per capita*, while the less developed countries lag behind the most developed countries more than GDP *per capita* comparisons suggest. Decancq and Schokkaert (2016) used micro data for 18 European countries in 2008 and 2010 to show that conclusions about changes in overall well-being depend largely on whether individual well-being is measured by income or equivalent income and whether the social welfare function accounts for inequality.

In our analysis, we examine the average income and equivalent income, inequality of their distributions, and income- and equivalent income-based social welfare, represented by a distribution-sensitive social welfare function. We look at not only the

levels of these indicators in 2007 and 2011, but also their changes between the two years. Throughout, we make comparisons between the income-based and equivalent income-based indicators in order to answer the question of whether measuring individual well-being by equivalent income, rather than by income, makes any substantial difference. In particular, we compare the magnitudes of income- and equivalent income-based indicators, the magnitudes and signs of their growth rates, and country rankings. The analysis includes a couple of decompositions. First, we decompose equivalent income inequality into the respective contributions of inequalities in income and non-income dimensions, in order to see how the well-being dimensions compare in terms of their contributions to equivalent income inequality. In particular, we are interested in how the contribution of income compares to the contributions of non-income dimensions, and how the contributions of non-income dimensions compare among themselves. Further, for both income and equivalent income, we decompose the cross-country variation in social welfare into the contributions of variation in means and variation in inequality, in order to see whether the relative magnitudes of the two sources of variation change upon switching from income to equivalent income. Finally, we decompose the cross-country variation in equivalent income-based social welfare into the contributions of variation in income-based social welfare and variation in the average achievements in non-income dimensions. This decomposition enables us to see how important including non-income dimensions is in accounting for countries' overall well-being when it is conceptualised as multi-dimensional and distribution-sensitive.

We make the following contributions to the literature. First, this is the first paper using equivalent income where equivalent income inequality is decomposed in a straightforward way, into the contributions of income and non-income dimensions, and for multiple countries. The closest to our approach are Ledić and Rubil (2019) who decomposed the difference in income and equivalent income inequality into i) the vertical effect which arises from the correlation between income and non-income dimensions and between income and preferences and ii) the re-ranking effect which occurs upon changing positions between income and equivalent income distributions. Decancq and Schokkaert (2016) estimated equivalent income inequality for 18 countries and compared it to income inequality, but did not provide any decomposition. Decancq, Fleurbaey and Schokkaert (2017) decomposed inequality in equivalent income in a number of contributions, including the correlations between dimensions, inequality in particular dimensions and preference heterogeneity. However, they did that for only one country (Russia), whereas we provide evidence for a larger set of 27 countries. Second, unlike others, we quantify the contributions of cross-country variations in mean equivalent income and equivalent income inequality to the cross-country variation in equivalent income-based social welfare. In addition, we compare the results with those obtained from the same decomposition of income-based social welfare to see if the introduction of non-income dimensions changes the relative importance of the distributional (or equity) aspect of social welfare. Third, to our knowledge, we are the first to exploit the fact that, given the social welfare function we are using, the

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natural logarithm of equivalent income-based social welfare is a linear function of the natural logarithm of income-based social welfare and the average levels of non-income dimensions. This simple functional relationship enables us to assess the contributions of income-based social welfare and average levels of non-income dimensions to equivalent income-based social welfare.

The results can be summarised as follows. The difference between the average income and the average equivalent income is substantial in the sense that for all countries, the latter amounts to less than half of the former. Although the ranking of countries in a given year by the mean equivalent income is very much the same as that by the mean income, the rankings by growth rates, which for most countries differ not only in magnitude (when they are of the same sign), but also by the sign, are quite different. Equivalent income inequality is much higher than income inequality, and country rankings by both the level and change in equivalent income inequality are substantially different from the respective rankings by income inequality. Non-income dimensions contribute more than income to equivalent income inequality, and among them health is by far the most important non-income dimension. Concerning distribution-sensitive social welfare, the cross-country variation in income-based social welfare is almost entirely accounted for by variation in the mean income, which is considerably less the case for equivalent income-based social welfare. The cross-country variation in equivalent income-based social welfare is dominantly accounted for by variation in non-income dimensions, health in particular. Thus, focussing only on income while leaving non-income dimensions (i.e. especially health) out of cross-country well-being comparisons amounts to neglecting a great deal and leads to a largely incomplete picture of well-being.

The rest of the paper is organised as follows. In section 2, we define equivalent income, we explain how to estimate preferences and calculate equivalent incomes. Section 3 describes the data. In section 4, we estimate the life satisfaction model and discuss the estimates. Section 5 presents the results. Summary and conclusions are in the last section.

2 EQUIVALENT INCOME

We need a multidimensional measure satisfying several requirements. First, the measure should be defined at the individual level so that it is possible to assign the value of multidimensional well-being to each person. This is essential for the measure to capture correlations between income and non-income dimensions or, in other words, to take into account their joint distribution. Second, it should summarise income and non-income dimensions for each person in a number, and the relative weights of the dimensions should not be arbitrary but rather theoretically justified and estimated from data. Third, it should be a cardinal ratio-scale variable so that both ratios and differences of two persons' levels of multidimensional well-being should make sense. Fourth, it should be expressed in monetary units. All the requirements, except the part of the second one concerning weighting, are needed for the measure to be directly comparable to income at the individual level

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so that the standard tools of distributional analysis can be applied to both income and the measure of multidimensional well-being.

A multi-dimensional measure that satisfies these requirements is the so-called equivalent income (see Decancq, Fleurbaey and Schokkaert, 2015a; 2015b; Fleurbaey, 2015). Let individual i's well-being be a function of her income, Y_i , and D non-income dimensions collected in vector $X_i=(X_{1i}, X_{2i}, \ldots X_{Di})$. Suppose all the non-income dimensions have well-defined best (most preferred) levels denoted by $X^*=(X^*_1, X^*_2, \ldots X^*_D)$. Let every individual have a utility function, U_i, with income and non-income dimensions as arguments, determining her cardinal utility level. With this notation, i's equivalent income, Y^*_i, can be defined as

$$U_i(Y_i, X_i)=U_i(Y^*_i, X^*) \quad (1)$$

The equivalent income of individual i represents her hypothetical amount of income which, when she has all non-income dimensions at the best levels, gives her the same utility level as the combination of her actual income and non-income dimensions. By the definition, if i is at the best levels of non-income dimensions, her equivalent income equals her income. The difference between i's income and equivalent income can thus be understood as i's willingness-to-pay (WTP_i) to have the best levels of non-income dimensions: $Y^*_i=Y_i-WTP_i$. Thus, for individuals i and j, even if Y_i is higher than Y_j, Y^*_i will be lower than Y^*_j if WTP_i is sufficiently larger than WTP_j.

It may seem reasonable not to bother constructing individuals' equivalent incomes when one can just compare their utility levels. Yet doing so one would assume that individuals i and j have the same cardinalisations of their utility functions which is quite restrictive assumption to make. However, one reason why individuals can have different cardinalisations of the utility function is due to their different aspirations. A person forms aspirations relative to either herself in the past, or in the future, or her peer (or reference) group. For example, suppose two persons have the same income and health, but one of them is from a disadvantaged family where the parents were ill and thus able to earn income sufficient only for poor living standard, while the other is from a family where the parents were healthy and able to earn a high income. If the income and health of the person from the disadvantaged family are now higher than what her family enjoyed while she was growing up, she may be very happy or satisfied with her life. Indeed, even more so than the person from the well-off family who may not see her current situation as something with which she should be particularly satisfied.

The previous argument goes against using the answers to subjective well-being (happiness, life satisfaction) questions in surveys as interpersonally comparable well-being measures. However, this does not mean that the answers to such survey questions are worthless for empirical welfare analysis. As shown by Decancq, Fleurbaey and Schokkaert (2015a; 2015b), one can use happiness and life

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satisfaction data to estimate ordinal preferences, a crucial piece of information required for the construction of individual equivalent incomes. The key assumption is that the answers to subjective well-being questions contain information on ordinal preferences, although these answers may not be appropriate as a metric of individual well-being. Denoting person i's reported subjective well-being (as a proxy for utility U_i) by S_i, this premise is embodied in the "consistency assumption" (Decancq, Fleurbaey and Schokkaert 2015a; 2015b) which says that the individual i weakly prefers, according to her ordinal preferences, combination (Y_i, X_i) over combination (Y_i', X_i') if and only if $S_i(Y_i, X_i) \geq S_i(Y_i', X_i')$. The following assumption can also be stated in a setting where two individuals with common preferences and aspirations are compared, which implies that the individuals i and j, weakly prefer (Y_i, X_i) over (Y_j, X_j) if and only if $S_i(Y_i, X_i) \geq S_i(Y_j, X_j)$. Essentially, since i and j have common ordinal preferences and, in addition, they have the same aspirations, they can be treated as the same person, and therefore an *inter*personal comparison turns into an *intra*personal comparison.

For the consistency assumption to be satisfied, the subjective well-being question must be such that it asks respondents to perform an evaluation of their lives, rather than to express their affections. As argued by Decancq, Fleurbaey and Schokkaert (2015a; 2015b), questions asking about life satisfaction as a more evaluative concept appear in that sense better than those asking about happiness as a more affective concept, capturing also daily moods.[3] In addition, there should be a sufficiently rich set of personal characteristics related to aspirations, because leaving them out would amount to comparing subjective well-being among people with different aspirations and thus different cardinalisations of the utility function.

Provided that the consistency assumption holds and having the individual data on subjective well-being, income, non-income dimensions and characteristics related to aspirations, one can estimate ordinal preferences by estimating the parameters of an econometric model in which subjective well-being is modelled as a function of income, non-income dimensions and aspirations-related variables. Assuming linearity in parameters and diminishing marginal utility of income, the model is

$$S_i = \alpha + \beta \ln Y_i + \gamma' X_i + \pi' Z_i + u_i \qquad (2)$$

where Z_i is the aspirations-related characteristics, u_i is a random error term and $(\alpha, \beta, \gamma, \pi)$ is the set of parameters to be estimated. Since in this linear specification the term $\pi' Z_i$ scales S_i up and down, we call Z_i the scaling factors.[4] Using the estimated parameters from (2) and using the definition of equivalent income in equation (1), we get

[3] Research has shown that the answers to these two types of question in existing surveys are highly correlated (Clark, 2016), more than the conceptual distinction would suggest.
[4] Using the terminology from Decancq, Fleurbaey and Schokkaert (2015a; 2015b) and Decancq and Schokkaert (2016).

$$\hat{\alpha} + \hat{\beta} \ln Y_i + \hat{\gamma}' X_i + \hat{\pi}' Z_i + u_i = \hat{\alpha} + \hat{\beta} \ln Y_i^* + \hat{\gamma}' X^* + \hat{\pi}' Z_i + u_i$$

and solve for equivalent income to obtain

$$Y_i^* = Y_i \exp((\hat{\gamma} / \hat{\beta})'(X_i - X^*)) \quad (3)$$

Notice that the expression (3) does not contain the scaling factors, which ensures that equivalent income, unlike subjective well-being score, does not depend on aspirations. Person *i*'s equivalent income is a function of her income, an ordinal preference (i.e. "pan-European") determined by the ratios $(\hat{\gamma}/\hat{\beta})$ and of the shortfalls of her non-income dimensions from their best levels, $(X_i - X^*)$. If $\hat{\gamma}$'s are all zero (meaning that non-income dimensions do not affect subjective well-being at all) or if non-income dimensions are all at their best levels, then $Y_i^* = Y_i$ will hold. In all other cases $Y_i^* < Y_i$ will hold, depending on how strongly non-income dimensions are valued relative to income and how far they are from their best levels. Generally, the more (less) valued non-income dimensions are relative to income, and the larger (smaller) the gaps between the actual and best levels of non-income dimensions, the farther (closer) will equivalent income be from income.

The concept of equivalent income as we use it in this paper treats ordinal preferences as common to all individuals. In other words, there is no preference heterogeneity among individuals, not even among groups of individuals. In that respect our usage of the concept of equivalent income as a measure of multidimensional well-being differs from how it is originally motivated by Decancq, Fleurbaey and Schokkaert (2015a; 2015b) and applied by Schokkaert, Van Ootegem and Verhofstadt (2011), Decancq, Fleurbaey and Schokkaert (2015a; 2015b; 2016), Decancq and Schokkaert (2016), Decancq and Neumann (2016), Decancq, Schokkaert and Zuluaga (2016), Defloor, Verhofstadt and Van Ootegem (2017). They are primarily motivated by the possibility of taking into account heterogeneity of preferences. Not doing so would amount to neglecting the principle of individual sovereignty (or the "personal preference principle" in Decancq, Fleurbaey and Schokkaert's (2015a; 2015b) terminology), an idea of individuals differing in what they themselves consider to be a good life. Put differently, respecting individual sovereignty means respecting differences in how people weight different life dimensions. In these papers, preference heterogeneity is modelled by introducing variables deemed relevant for differences in preferences, by way of interacting them with income and non-income dimensions in model (2). Since it is impossible to estimate strictly individual preferences, preference heterogeneity is modelled and estimated as heterogeneity among a number of social groups, depending on the choice of variables affecting preferences and the range of values or modalities of these variables. All the papers mentioned above found that there is preference heterogeneity.

The reason why we consider homogeneous, rather than heterogeneous, preferences relates to our objective to investigate changes in well-being and its distribution in the European Union over the period 2007-2011. We are focused on

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comparing well-being using income and equivalent income measures. If we opted for heterogeneous preferences, in accounting for changes over time we would need to distinguish between, on the one hand, the effect of changes in income and non-income dimensions and, on the other hand, the effect of changes in preferences. This task would be difficult without complicating the analysis and drawing attention away from our main objective, namely to explore the consequences of using a multi-dimensional well-being concept instead of income.[5] This is not to deny the potential importance of preference heterogeneity, but rather to simplify the analysis of a topic that is still scarcely researched.

3 DATA

3.1 EUROPEAN QUALITY OF LIFE SURVEY

The data we use come from the European Quality of Life Survey (EQLS) 2007 and 2011 for the EU-27 countries.[6] For this study, it is important that the EQLS contains data on life satisfaction, income, a number of non-income dimensions and a sufficiently rich set of personal and household characteristics to be used as the scaling factors. The sample sizes differ across countries and years. The sample of all completed interviews ranges in 2007 from 1000 to 2008 and in 2011 from 1000 to 3055, with the mean sizes of respectively 1134 and 1315. After removing observations with incomplete information, we are left in 2007 with the range from 376 to 1364 and in 2011 from 474 to 2312, with the respective means of 700 and 930. The model (2) is thus estimated on the total sample of 44,016 observations (67 percent of the total original sample) consisting of 18,899 observations for 2007 and 25,117 observations for 2011. In appendix Table A1 we give the number of observations per country and year.

3.2 VARIABLES: SUBJECTIVE WELL-BEING, INCOME, NON-INCOME DIMENSIONS AND SCALING FACTORS

3.2.1 SUBJECTIVE WELL-BEING: LIFE SATISFACTION

The variable representing it in the survey is the life satisfaction score, an integer on a 1-10 scale. It is the response to the question: *All things considered, how satisfied would you say you are with your life these days? Please tell me on a scale of 1 to 10, where 1 means very dissatisfied and 10 means very satisfied.*

3.2.2 INCOME

We rely on disposable household income per adult equivalent.[7] The survey first asks for the household's disposable income per month, and if the respondent does not know the exact amount, she can choose one among 21 income intervals. For those individuals who have answered the latter question only, the average of the interval's limits is taken. All incomes are converted by Eurofound into purchasing

[5] Decancq and Schokkaert (2016) argue that interpreting changes in equivalent income over time becomes difficult if one wants to retain the heterogeneity of preferences.
[6] See European Quality of Life Surveys (EQLS).
[7] Based on the OECD equivalence scale: the first adult is counted as 1, the remaining adults as 0.5 each, and children as 0.3 each, where children are household members aged 0-13 years.

power standard (PPS) euros. Since in our analysis we deal with the population means and inequality measures, it is important for us that these statistics, calculated from the EQLS income data, match as closely as possible those calculated from other sources, such as national accounts in the case of population mean and Eurostat's figures on income inequality derived from the EU-SILC[8].

To ensure that, we had to do rescaling of the EQLS incomes, the purpose of which is to ensure the following. First, the decile shares of equivalised household disposable income from the EQLS must be equal to the decile shares from the EU-SILC. Under the assumption that most inequality in income distribution is due to differences between the mean incomes of decile groups, by getting the decile income shares in line with those based on the EU-SILC income data we try to obtain Gini indices of income inequality computed from the EQLS incomes to be as close as possible to the Ginis computed from the EU-SILC incomes. Second, the mean disposable income per household member must be equal to the closest concept from national accounts in *per capita* terms. Following Decancq and Schokkaert (2016), we take that national accounts income concept to be the net national income *per capita* (obtained from Eurostat).[9]

3.2.3 NON-INCOME DIMENSIONS

Unemployment. A person is considered unemployed if he/she reported. Economic inactivity is clearly distinguished from unemployment, so that the retired, housewives and others outside of the labour market and not working are "non-unemployed." Thus, the alternative to unemployment is not employment, but rather non-unemployment (of which employment is but one form). Research has shown that unemployment may be psychically harmful (e.g., Clark and Oswald, 1994; Darity and Goldsmith, 1996; Helliwell and Huang, 2014; Wulfgramm, 2014), and for that reason being unemployed is here considered an unfavourable status apart from its effect on the material living standard through income loss.

Health. Health is measured by the answers to the standard question on general self-assessment of one's health. The answer modalities are *very good*, *good*, *fair*, *bad* and *very bad*. Yet, since this information about a person's general health situation is necessarily the person's subjective expression of her general feeling, one may object that it should not be used as indicating objective features of her state of health. The grounds for the objection would be the same as the grounds for arguing against using the subjective well-being score as a measure of well-being, namely that self-assessment of health is highly influenced by health aspirations, just as subjective well-being is influenced by general well-being aspirations. These aspirations are conceivably related to certain personal characteristics, such as age, sex and personal health history. However, there are studies showing that self-assessed

[8] European Union Statistics on Income and Living Conditions – the official source of distributional statistics for the European Union of Eurostat.

[9] The rescaling procedure is described in Appendix 2. We also provide a comparison of inequality measures for incomes before and after rescaling and, in addition, analyse how much incomes are distorted by the recaling.

health is indeed sufficiently strongly associated with mortality, even after controlling for potential confounders, such as depression and co-morbidity (for reviews, see Idler and Benyamini, 1997; Kawada, 2003 and DeSalvo et al., 2006).

Housing quality. The survey asks respondents if they have any of the following problems with their accommodation: i) shortage of space, ii) rot in windows, doors or floors, iii) damps or leaks in walls or roof, iv) lack of indoor flushing toilet and v) lack of bath or shower. An important reason why housing quality may not be redundant when income is included is that respondents are not asked to report their permanent income, a longer-term average, but rather the amount they command currently. That said, if the permanent income is low in spite of the current one being high, then given that improvements in housing quality usually require sizeable expenses (say, buying a new apartment or doing a major renovation), high current income can go along with low housing quality.

Crime. It has been shown that crime has an adverse effect on well-being (e.g., Powdthawee, 2005; Cornaglia, Feldman and Leigh, 2014; Dustmann and Fasani, 2016). The respondent is asked whether he/she has *major*, *moderate* or *no problems* with crime, violence or vandalism in the immediate neighbourhood of his/her home. People may care not only about crime, violence and vandalism in the immediate neighbourhood, but also in a wider area, presumably for fear of possible spillover effects on the narrow areas they live in. Yet, arguably, the situation with crime in people's immediate neighbourhood is much more important for their well-being than the situation with crime in the country as a whole.

Environmental quality. Environmental quality covers the quality of drinking water and air. Thus, one's possible concerns for the natural environment in general, with its many aspects, are not entirely captured, except insofar as the captured aspects are related to environmental problems in general. As in the case of crime, the focus is on problems with drinking water and air in one's immediate neighbourhood, and not in the country as a whole. The survey question is also posed in the same way as in the case of crime: whether the respondent has *major*, *moderate* or *no problems* with drinking water and air pollution.

3.2.4 SCALING FACTORS

The EQLS contains information on a rich set of socio-demographic characteristics and attitudinal variables. We use a number of these as the scaling factors: age, sex, education, marital/relationship status, settlement type (degree of urbanisation), parental status, and trust in people and institutions. These variables, together with some of the variables we take as well-being dimensions, are commonly used as covariates in life satisfaction and happiness regressions. Moreover, more often than not, many of them are usually found both substantially and statistically significant (Dolan, Peasgood and White, 2008).

Summary statistics for all variables (i.e. life satisfaction, dimensions and scaling factors) are given in Appendix Table A2.

4 ESTIMATION OF PREFERENCES AND CALCULATION OF EQUIVALENT INCOMES

To estimate the parameters determining preferences, we specify the following model of life satisfaction:

$$\begin{aligned} S_i = {} & \alpha + \beta \ln Y_i + \gamma_1 \mathrm{UNE}_i + \gamma_2 \mathrm{HEAvbad}_i + \gamma_3 \mathrm{HEAbad}_i + \gamma_4 \mathrm{HEAfair}_i + \gamma_5 \mathrm{HEAgood}_i \\ & + \gamma_6 \mathrm{HOUspace}_i + \gamma_7 \mathrm{HOUrotten}_i + \gamma_8 \mathrm{HOUdamp}_i + \gamma_9 \mathrm{HOUbathtoil}_i + \\ & \gamma_{10} \mathrm{CRImoder}_i + \gamma_{11} \mathrm{CRImajor}_i + \gamma_{12} \mathrm{ENVwater}_i + \gamma_{13} \mathrm{ENVair}_i + \\ & \pi_1 \mathrm{male}_i + \pi_2 \mathrm{age}_i + \pi_3 \mathrm{age}_i^2 + \pi_4 \mathrm{edulow}_i + \pi_5 \mathrm{eduhigh}_i + \\ & \pi_6 \mathrm{marrcoh}_i + \pi_7 \mathrm{divsep}_i + \pi_8 \mathrm{widow}_i + \pi_9 \mathrm{urban}_i + \pi_{10} \mathrm{child}_i + \pi_{11} \mathrm{trust}_i + \\ & \pi_{12} \mathrm{year2011}_i + \sum_{C=2}^{27} \delta_C \mathrm{countryC}_i + u_i \end{aligned} \tag{4}$$

where the variables are as described in the previous section and in Appendix, and u_i is a random error term. The preference parameters used in the construction of equivalent incomes are β and γ_1 through γ_{13}. All other variables on the right-hand side are just scaling factors, and as such do not enter the expression for equivalent income. Since life satisfaction is an ordinal variable, the model is estimated as ordered logit model.

The estimates are presented in Table 1. We first estimated model (4) separately for each year. Coefficients determining preferences for 2007 are in general very similar to those for 2011 with only one statistically significant difference for the lack of bath or flushing toilet[10]. Thus, we have decided to pool the two years together for estimation. The results are generally in accordance with the existing literature estimating life satisfaction regressions (see Frey and Stutzer, 2002; Dolan, Peasgood and White, 2008 and Helliwell, Layard and Sachs, 2012).

[10] According to the Chow test.

Table 1

Ordered logit estimation of life satisfaction model

	2007		2011		Difference		2007 and 2011 pooled	
	Est.	**SE**	**Est.**	**SE**	**Diff.**	**p-value**	**Est.**	**SE**
lnY (β)	0.358	[0.031]***	0.296	[0.025]***	-0.062	0.124	0.324	[0.020]***
UNE (γ_1)	-0.661	[0.084]***	-0.690	[0.056]***	-0.029	0.773	-0.678	[0.047]***
HEAvbad (γ_2)	-2.264	[0.150]***	-2.313	[0.111]***	-0.049	1.000	-2.285	[0.089]***
HEAbad (γ_3)	-1.645	[0.071]***	-1.614	[0.060]***	0.031	1.000	-1.622	[0.046]***
HEAfair (γ_4)	-0.896	[0.050]***	-0.849	[0.042]***	0.047	0.474	-0.865	[0.032]***
HEAgood (γ_5)	-0.457	[0.042]***	-0.443	[0.035]***	0.014	0.803	-0.446	[0.027]***
HOUspace (γ_6)	-0.251	[0.042]***	-0.299	[0.036]***	-0.048	0.382	-0.282	[0.027]***
HOUrot (γ_7)	-0.330	[0.052]***	-0.317	[0.048]***	0.013	0.844	-0.317	[0.035]***
HOUdamp (γ_8)	-0.245	[0.048]***	-0.181	[0.042]***	0.064	0.318	-0.205	[0.032]***
HOUbathtoil (γ_9)	-0.219	[0.067]**	-0.054	[0.064]	0.165	0.076	-0.143	[0.046]**
CRImoder (γ_{10})	-0.126	[0.034]***	-0.131	[0.029]***	-0.005	0.924	-0.125	[0.022]***
CRImajor (γ_{11})	-0.202	[0.053]***	-0.232	[0.063]***	-0.030	0.721	-0.202	[0.039]***
ENVwater (γ_{12})	-0.160	[0.037]***	-0.147	[0.035]***	0.013	0.803	-0.153	[0.025]***
ENVair (γ_{13})	-0.087	[0.034]*	-0.116	[0.032]***	-0.029	0.534	-0.097	[0.023]***
male (π_1)	-0.123	[0.030]***	-0.067	[0.025]**	0.056	0.151	-0.087	[0.019]***
age (π_2)	-0.059	[0.006]***	-0.053	[0.005]***	0.006	0.415	-0.056	[0.004]***
age^2 (π_3)	0.641	[0.057]***	0.584	[0.045]***	-0.057	0.432	0.616	[0.035]***
edulow (π_4)	-0.212	[0.056]***	0.015	[0.051]	0.227	0.003	-0.094	[0.038]*
eduhigh (π_5)	0.020	[0.037]	0.015	[0.029]	-0.005	0.921	0.020	[0.023]
marrcoh (π_6)	0.353	[0.057]***	0.277	[0.043]***	-0.076	0.286	0.295	[0.034]***
divsep (π_7)	-0.309	[0.071]***	-0.231	[0.054]***	0.078	0.380	-0.263	[0.043]***
widow (π_8)	-0.173	[0.077]*	-0.170	[0.059]**	0.003	0.975	-0.182	[0.047]***

	2007		2011		Difference		2007 and 2011 pooled	
	Est.	**SE**	**Est.**	**SE**	**Diff.**	**p-value**	**Est.**	**SE**
urban (π_9)	-0.048	[0.037]	-0.050	[0.030]+	-0.002	0.963	-0.062	[0.023]**
child (π_{10})	0.144	[0.048]**	0.146	[0.037]***	0.002	0.970	0.158	[0.029]***
trust (π_{11})	0.286	[0.011]***	0.222	[0.009]***	-0.064	0.000	0.247	[0.007]***
year2011 (π_{12})							0.110	[0.020]***
pseudo R^2	0.106		0.077				0.087	
log likelih.	-34,000		-47,000				-82,000	
chi-2	5,783		5,983				11,000	
N	18,899		25,117				44,016	

*Note: Ordered logit estimates. Dependent variable: life satisfaction, with integer values from 1 (very dissatisfied) to 10 (very satisfied). All models include a constant (α) (coefficient not reported) and country dummies (δ2, δ3,..., δ27) (coefficients not reported). In column "Difference", the differences are obtained by subtracting the coefficients for 2007 from those for 2011. For definitions of variables, see section 3 and Appendix. Robust standard errors are in brackets. +, *, ** and *** indicate statistical significance at the 10, 5, 1 and 0.1 percent level, respectively. The reference individual: woman, secondary education, single, from rural settlement, childless, surveyed in 2011, from Austria, non-unemployed, with all non-income dimensions at the best levels. Weights are used in all estimations.*

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All coefficients determining preferences have the expected signs, they are positive for income and negative for the indicators representing non-income dimensions. The coefficients on non-income dimensions are negative because for each of them the reference is the best level. All these coefficients are also statistically highly significant. Concerning the scaling factors, the signs of estimated coefficients are generally in line with the broad literature.

We plug the estimated preference parameters (β and γ's) in expression (3) to obtain each individual's equivalent income. Since the most preferred levels of all indicators representing non-income dimensions are equal to zero, individual equivalent income is given by:

$$Y_i^* = Y_i \exp\left[\varphi_1 \mathrm{UNE}_i + \varphi_{HEA}\,'\mathrm{HEA}_i + \varphi_{HOU}\,'\mathrm{HOU}_i + \varphi_{CRI}\,'\mathrm{CRI}_i + \varphi_{ENV}\,'\mathrm{ENV}_i\right] \quad (5)$$

where

$$\varphi_{HEA}\,'\mathrm{HEA}_i = \varphi_2 \mathrm{HEAvbad}_i + \varphi_3\,\mathrm{HEAbad}_i + \varphi_4 \mathrm{HEAfair}_i + \varphi_5 \mathrm{HEAgood}_i$$
$$\varphi_{HOU}\,'\mathrm{HOU}_i = \varphi_6 \mathrm{HOUspace}_i + \varphi_7 \mathrm{HOUrotten}_i + \varphi_8 \mathrm{HOUdamp}_i + \varphi_9 \mathrm{HOUbathtoil}_i$$
$$\varphi_{CRI}\,'\mathrm{CRI}_i = \varphi_{10} \mathrm{CRImoder}_i + \varphi_{11} \mathrm{CRImajor}_i$$
$$\varphi_{ENV}\,'\mathrm{ENV}_i = \varphi_{12} \mathrm{ENVwater}_i + \varphi_{13} \mathrm{ENVair}_i$$
$$\varphi_k = \hat{\gamma}_k / \hat{\beta},\ k \in \{1,2,...,13\}$$

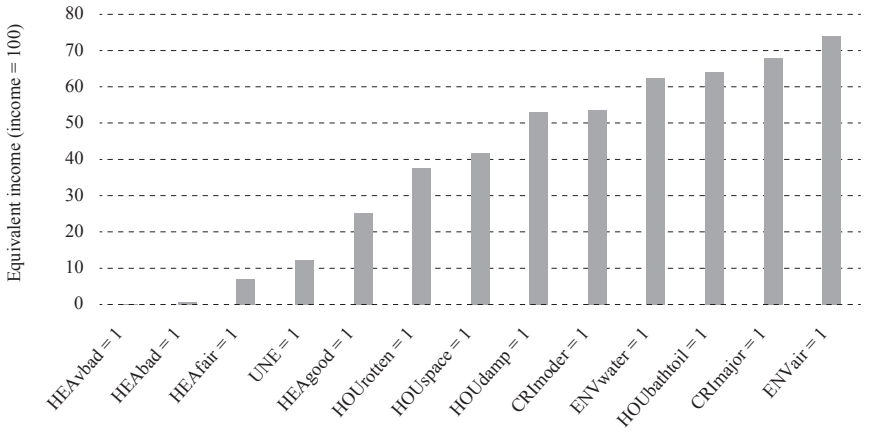
So far, we did not compare the magnitudes of the preference parameter estimates, as we have only commented on the signs of these estimates. To see how strong, the deprivations in non-income indicators are relative to each other, we do the comparison in the following way. We compute how large a person's equivalent income relative to her income would be if she suffered just one particular deprivation. This gives us 13 different values of equivalent income expressed as a percentage of income. Comparing them with one another shows each indicator's relative importance. In addition, since without any deprivation, equivalent income equals income, we can see just how harmful the shortfall in a particular non-income dimension from its best level is for individual multidimensional well-being.

These relative equivalent incomes are shown in Figure 1. What strikes one immediately is the importance of health, as those individuals with very bad, bad or fair, rather than very good health, have equivalent income as low as 0.1, 0.7 and 6.9 percent of their income, respectively. Equivalent income of the unemployed represents about 12 percent of their income. Those living in insufficiently spacious dwellings or dwellings with rotten parts see their well-being reduced by roughly 60 percent, while those facing damps or leaks and those living in neighbourhoods with major crime, violence or vandalism by about 50 percent of their income. Less harmful, but still notably so, is to have problems with the quality of drinking water or to have no bath or toilet, whose equivalent income is about two thirds of their

income. Finally, those residing in neighbourhoods with moderate crime or vandalism and those with air quality problems suffer the least, as their equivalent incomes are below income by about a third and a quarter, respectively.

Figure 1

Individual counterfactual equivalent income



Note: Example of interpretation: 0.1 above the bar labelled HEAvbad, means that is a person is in very bad, rather than very good, health (i.e., if HEAvbad = 1) and has all the other non-income dimensions at their reference (best) levels, her equivalent income is 0.1 percent of her income. The figure is calculated as: 100exp(φ2). Other figures can be calculated and interpreted in the same way.

These magnitudes may seem unreasonable. Even if one accepts as reasonable that suffering from very bad or bad health is associated with very low well-being, the implied suffering of someone having good rather than very good health may seem quite exaggerated (about 75 percent of income). This intuition is based on what one would expect people to answer if asked directly in a contingent valuation; for example: "*You consider your health good rather than very good. Suppose that you have the possibility to pay some percentage of your income to switch from good to very good health. What is this percentage*?" Given problems with contingent valuation as a method of preference elicitation, it is not clear whether we need to take the average answer as a check of whether the percentages implied by preferences estimated through the life satisfaction approach are reasonable. Thus, even if many people considered the magnitudes of suffering from not attaining the best levels of non-income dimensions too high, this may not be sufficient to discard these magnitudes as unreasonable.

To check if the high magnitudes of suffering from deprivations in non-income dimensions are such only because of our data, it is useful to look at similar papers. For example, in a paper that also uses the life satisfaction approach to estimate preferences, Decancq and Schokkaert (2016) also estimated preference parameters that imply very high magnitudes of suffering from unemployment and less than

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perfect health. For example, their estimates imply that the equivalent income of a person with very bad health and no deprivations in other non-income dimensions is about one percent of her income, and the respective figures for bad, fair and good health are 4.2, 13.8 and 39 percent, respectively. As regards unemployment, an unemployed person's equivalent income is about 11 percent of her income.[11]

5 INCOME AND EQUIVALENT INCOME IN THE EU OVER 2007-2011

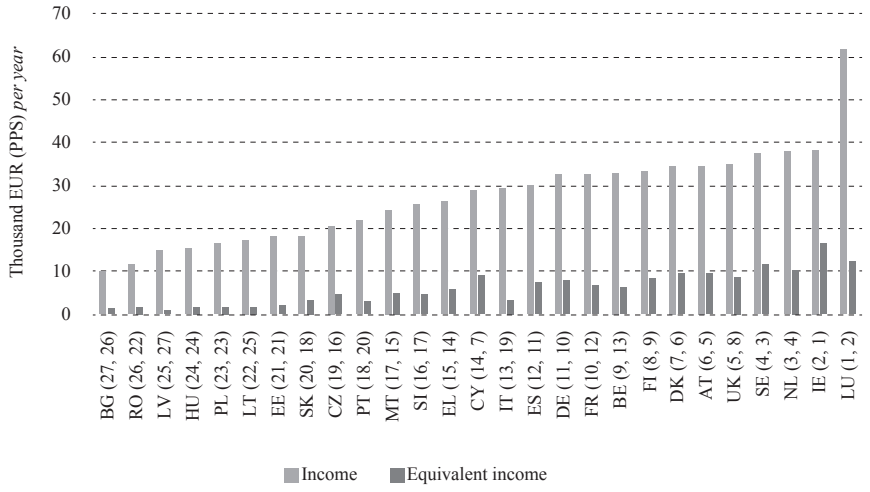
5.1 AVERAGE INCOME AND EQUIVALENT INCOME

Levels of the average income (μ) and equivalent income (μ*) across countries and years are shown in Figure 2. There is a positive correlation between mean incomes and equivalent incomes: for levels, in 2007 (2011) it is 0.86 (0.96) while for ranks it is 0.95 for both years. Still, the rank for some countries changes substantially. For example, Italy in 2007 is ranked 13th by μ, and 19th by μ*, while Cyprus climbs from the 14th to the 7th place. However, for most countries the rank changes by only one or two places. This fact shows that taking non-income dimensions into account when constructing a well-being measure does not lead to a substantially different picture of how countries are ranked by the mean well-being.

FIGURE 2

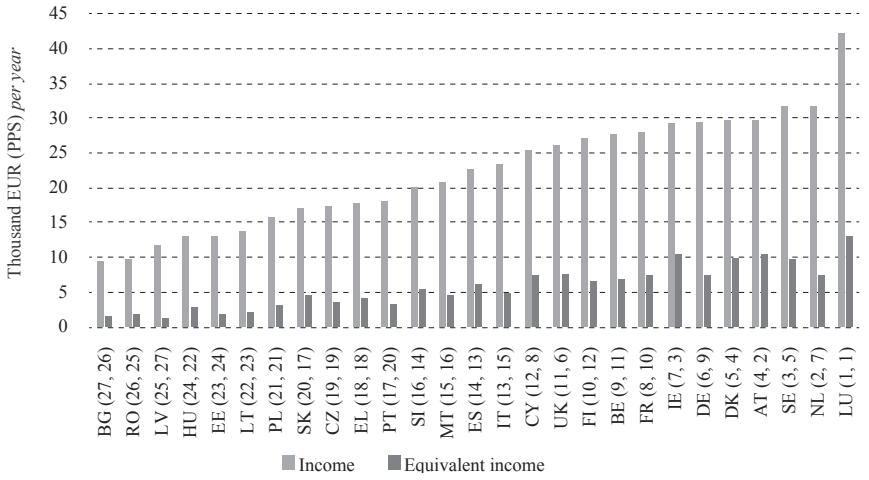
Average incomes and equivalent incomes

a) 2007

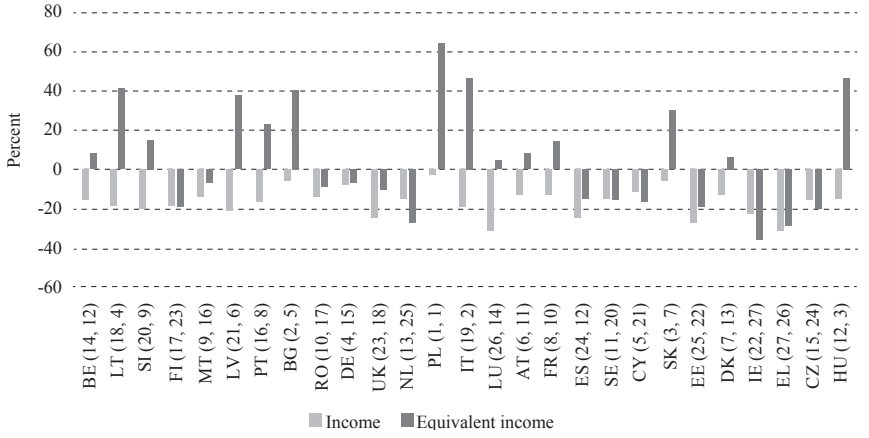


[11] Unlike our model, Decancq and Schokkaert's (2016) model of life satisfaction allows for preference heterogeneity and non-linearity of income and health effects on life satisfaction. The figures we report are based on preferences of their reference group, but those for other groups do not differ very much, and thus generally imply strong suffering from deprivations in non-income dimensions as well. The model is estimated on the 2008 and 2010 European Social Survey data for 18 countries. The reason for choosing this paper for comparison is that other papers estimate preferences for single countries and thus may not be comparable (Decancq, Fleurbaey and Schokkaert, 2015a; 2016; Decancq and Neumann, 2016; Decancq, Schokkaert and Zuluaga, 2016). However, even the estimates from these papers imply very high suffering from deprivations in non-income dimensions, of the order of magnitude estimated in the present paper.

b) 2011



c) Change 2007-2011



Note: The first (second) number in parentheses next to a country label is the country's rank by the average income (equivalent income) or, on the bottom panel, by the respective growth rates.

In both years and for all countries, μ^* amounts to less than half of μ or, in other words, the mean WTP amounts to more than half of the mean income. This shows that deprivations in non-income dimensions have a strongly detrimental effect on well-being, as expected given the effects of particular deprivations discussed in the previous section. Considering both years, the ratio μ^*/μ (multiplied by 100) ranges from only 6.1 percent (Latvia in 2007) to 42.8 percent (Ireland in 2007), with the average of 20.4 percent in 2007 and 24.1 percent in 2011.

Further, the relative dispersion of μ is smaller than that of μ^*. In 2007, the coefficient of variation (CV) of μ is 0.39, whereas for μ^* we find CV = 0.64. The respective CVs for 2011 are 0.36 and 0.54. Thus, in relative terms, countries differ

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considerably less in their μ than in their μ^*. This indicates that countries differ more from one another in terms of non-income dimensions than in terms of income, so that the relative differences in average well-being get amplified upon switching from income to equivalent income.

We turn now to the growth rates of μ and μ^*. The bottom panel of Figure 2 shows the cumulative growth over 2007-2011. For all countries μ fell – expectedly, given the period studied. The drop in μ ranges from 2.9 percent in Poland to as much as 31.8 percent in Luxembourg and Greece, and for most of the countries (19 out of 27) the growth rates were in the range from -10 to -25 percent, with -17.3 percent on average. At this point, we have to stress that there are differences between these growth rates and the growth rates of GDP or even GDP *per capita*, for a number of reasons. First, individual income is rescaled for each country so that its mean per household member equals net national income *per capita*, and that its Gini coefficient comes as close as possible to the one reported by Eurostat. Second, the rescaled income is transformed from per-capita to per-adult-equivalent values.[12] Nevertheless, the growth rates have the same signs as the cumulative GDP growth rates over 2007-2011.

Was the growth performance so gloomy when we consider equivalent income, rather than income? Even at first glance, the growth rates of μ^* hardly match those of μ. They are different not only in magnitude, but also in the sign. For about a half of the countries (14 out of 27), μ and μ^* changed in opposite directions while for almost all of them, the increase in μ^* is larger than the fall in μ. Growth rates of μ^* range from -38.5 percent (Ireland) to 64.6 percent (Poland), with the average of 5.8 percent. Measured by the coefficient of variation, variation of growth in μ^* is much higher (CV = 4.72) than variation of growth in μ (CV = 0.41). While we found a high positive correlation between μ and μ^*, their growth rates are correlated much less, 0.42 (0.35) for growth levels (ranks). About a third of the countries change the rank by more than 10 places. Some extreme cases are Germany, the Netherlands and Cyprus, going 11, 12 and 16 places down, respectively; and on the other side Lithuania, Latvia and Italy, going 14, 15 and 17 places up, respectively. Thus, whereas the countries' ranks by μ is very much in line with those by μ^*, this hardly holds for their growth rates. Of course, this type of result may well depend on the period over which the growth rates are computed.

5.2 INCOME INEQUALITY AND EQUIVALENT INCOME INEQUALITY

As the inequality measure, we use the Atkinson index (Atkinson, 1970) with the inequality aversion parameter ε=1, A_1, which ranges from zero (i.e. in case of perfect equality) to one (i.e. in case of perfect inequality):

$$A_1(y_1, y_2, ..., y_N) = 1 - \overline{y}^{-1}(\Pi_{i=1}^{N} y_i)^{1/N} \tag{6}$$

[12] For details, see the data section and Appendix 2.

where $(y_1, y_2, ..., y_N)$ is a vector of incomes, $\overline{y}$ is the mean income and N is the population size.

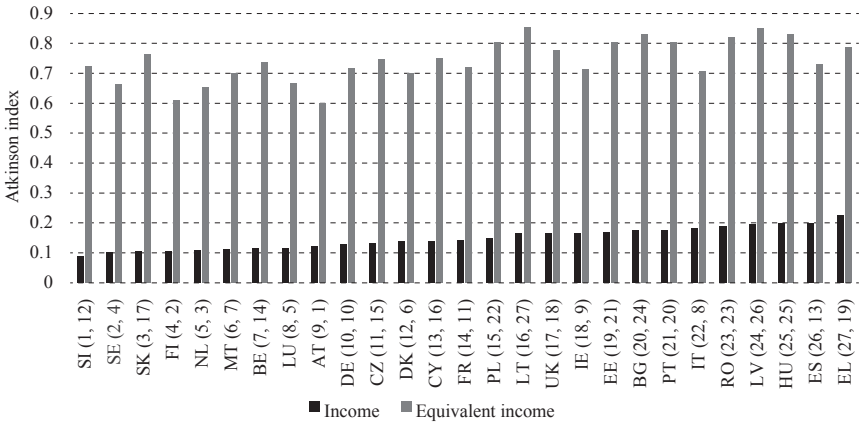
The Atkinson indices are shown in Figure 3. There is a striking difference between income and equivalent income inequality, the latter being much higher. While the Atkinson index for income (A_1) ranges, depending on country and year, from 0.09 to 0.22, the index for equivalent income (A_1^*)[13] is in the range 0.6-0.85. Considering both years, A_1^* is at least 3.5 times higher than A_1, and the ratio A_1^*/A_1 goes as high as 8, with the average of 5.3. Unlike in the case of means, where we had a high positive cross-country correlation, now the correlations are moderate with the level and rank correlations ranging between 0.60-0.66. Most of the countries change their rank by 6-8 places. The most extreme case is Hungary, with the fourth lowest A_1, but the second highest A_1^*, a jump of 21 places. Slovakia and Slovenia, in both years among the countries with lowest A_1, change their ranks substantially upon switching from income to equivalent income (Slovakia: 13 in 2007, 14 in 2011; Slovenia: 11 in both years). Thus, whereas high average income is a very good indication of high average equivalent income, high income inequality is a not-so-good indication of high equivalent income inequality.

Turning to changes in inequality over 2007-2011 we see that in most of the countries (16 out of 27) A_1 was reduced, with the largest (relative) reduction in Belgium (18.2 percent), followed by Lithuania and Slovenia (about 13 percent). In most countries A_1 fell by about 10 percent, and in only a few by less than 3 percent. Of the 11 countries with rising A_1, in seven of them the increase exceeded 10 percent, and in five it was close to or exceeded 20 percent (Denmark, Ireland, Greece, Czech Rep. and Hungary). The rise of more than 26 percent in Greece shows the economic slump had a very regressive distributive impact. Particularly remarkable increases took place in the Czech Republic where the Atkinson index went up by 39 percent, and in Hungary where it almost doubled (96 percent), though from relatively low levels.

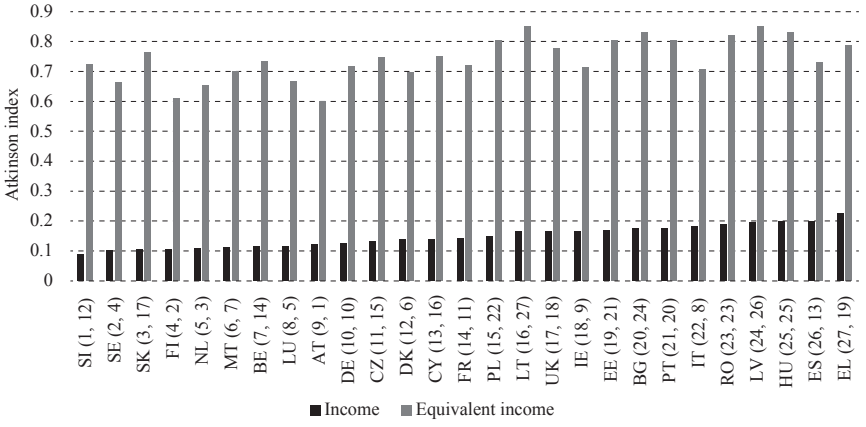
Even a casual inspection reveals significant discrepancies between changes in A_1 and A_1^*. The correlations are weak, 0.15 (0.36) for levels (ranks) of relative changes, both lower than the respective correlations between growth rates of the mean income and equivalent income. The directions of change are the same in only 16 countries, and mostly so for countries where inequality declined. While there are more countries with declining than with rising income inequality (declining in 16, rising in 11), the opposite holds in the case of equivalent income inequality (declining in 11, rising in 16). The magnitudes of changes also differ significantly. In almost all countries where changes are in the same direction, A_1 changed more than A_1^*.

[13] The Atkinson index for equivalent income should not be confused with Tsui's (1995) generalisation of this inequality measure to the multidimensional context.

FIGURE 3
Income and equivalent income inequality
a) 2007

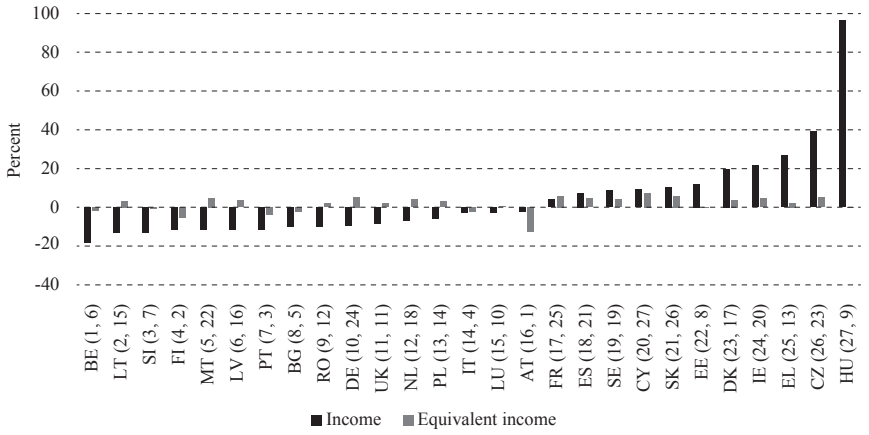


b) 2011



Thus, income and equivalent income inequalities do not need to change hand-in-hand: they can differ in terms of the direction of change or magnitude. Clearly, in countries where income inequality declined, and equivalent income inequality increased, inequality-reducing changes in income distribution were outweighed by inequality-increasing changes in the distributions of (some) non-income dimensions. Take, for example, Malta, where A_1 fell by 11.5 percent, whereas A_1^* increased by 4.9 percent. Similarly, where both income and equivalent income inequalities changed in the same direction, say increased, but the latter increases less (which, as the results show, tends to be the case), inequality-increasing changes in the income distribution took place along with inequality-reducing changes in the distributions of non-income dimensions. An example is the Czech Republic whose inequality in income increased by almost 40 percent, and inequality in equivalent income by about 5 percent only; or Hungary with almost doubled income inequality and virtually unchanged equivalent income inequality.

c) Change 2007-2011



Note: The first (second) number in parentheses next to a country label is the country's rank by the Atkinson index for income (equivalent income) or, on the bottom panel, by the respective growth rates.

Given that equivalent income is a function of income, non-income dimensions and the parameters determining preferences (which are fixed), equivalent income inequality can come only from income inequality and inequality in non-income dimensions. We now explore the structure of equivalent income inequality by decomposing it into the respective contributions of inequalities in income and non-income dimensions. Unfortunately, such a decomposition cannot be done with the Atkinson index, so we need to use another measure of relative inequality, namely the variance of logarithms:[14]

$$\mathrm{var}(\ln Y^*) = N^{-1}\sum_{i=1}^{N}\left(\ln Y_i^* - \overline{\ln Y_i^*}\right)^2 \tag{7}$$

where $\overline{\ln Y_i^*}$ is the mean of $\ln Y_i^*$.

To do the decomposition, we first log-linearise equation (5) to get

$$\ln Y_i^* = \ln Y_i + \varphi_1 \mathrm{UNE}_i + \varphi'_{HEA}\mathrm{HEA}_i + \varphi'_{HOU}\mathrm{HOU}_i + \varphi'_{CRI}\mathrm{CRI}_i + \varphi'_{ENV}\mathrm{ENV} \tag{8}$$

whose variance can be written as

$$\begin{aligned}\mathrm{var}(\ln Y^*) = {} & \mathrm{cov}(\ln Y^*, \ln Y) + \mathrm{cov}(\ln Y^*, \varphi_1 \mathrm{UNE}) + \mathrm{cov}(\ln Y^*, \varphi'_{HEA}\mathrm{HEA}) \\ & + \mathrm{cov}(\ln Y^*, \varphi'_{HOU}\mathrm{HOU}) + \mathrm{cov}(\ln Y^*, \varphi'_{CRI}\mathrm{CRI}) + \mathrm{cov}(\ln Y^*, \varphi'_{ENV}\mathrm{ENV})\end{aligned} \tag{9}$$

[14] We checked the correlation between the variance of logarithms of income/equivalent income and the Atkinson index that we used. The correlations are quite high. In the case of income, the level (rank) correlation is 0.96 (0.96) in 2007 and 0.76 (0.89) in 2011. In the case of equivalent income, the level (rank) correlation is 0.93 (0.92) in 2007 and 0.95 (0.95) in 2011.

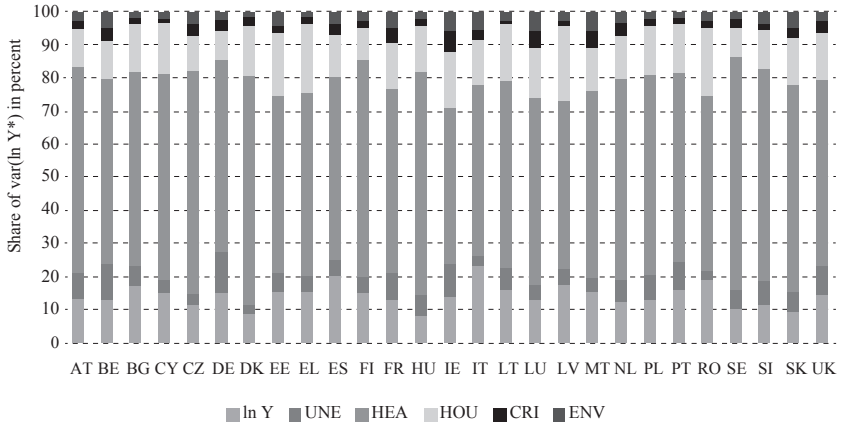
where the terms on the right-hand side are the contributions of, respectively, income, unemployment, health, housing, crime and environment.

The results are shown in Figure 4.[15] In both years, the contribution of income is much smaller than that of non-income dimensions. In 2007 (2011), income contribution ranges from 8.1 (11.5) to 23.1 (19.7) percent, with the average of 14.3 (14.6) percent, while the rest can be attributed to non-income dimensions. Considering the contributions of non-income dimensions, health has by far the largest contribution, ranging in 2007 (2011) from 47.1 (47.6) to 70.7 (69.9) percent, with the average of 58.8 (58.8) percent. This is in accordance with the calculations in section 4, where we examined the relative importance of deprivations in each of the non-income dimension and saw that health is the most important (see Figure 1). The second largest contribution is that of housing, contributing 14.4 (12.6) percent on average in 2007 (2011). Then come unemployment, environment and crime. Note that the contribution of unemployment is the third largest despite the fact that it was the second most harmful individual non-income deprivation (see Figure 1). This is because here the extent of suffering from non-income deprivations at the societal level is taken into account, while the calculations in section 4 were done at the individual level.

FIGURE 4

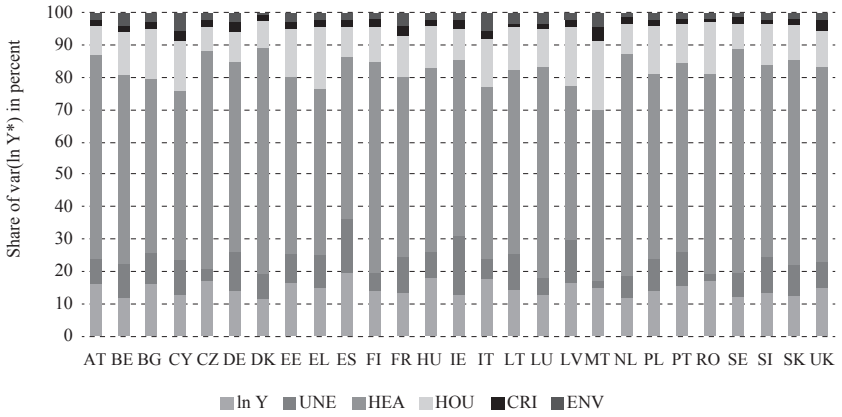
Decomposition of variance of logarithms of individual equivalent incomes

a) 2007



[15] We divide equation (9) by var(ln Y*) and multiply it by 100 to get the contributions add up to 100.

b) 2011



Note: Decomposition is based on equation (9). Y, UNE, HEA, HOU, CRI and ENV refer to the contributions of income, unemployment, health, housing, crime and environment, respectively.

5.3 DISTRIBUTION-SENSITIVE SOCIAL WELFARE

Focusing on the means amounts to being concerned with the efficiency aspect of social welfare, while focusing on inequality amounts to being concerned with its equity aspect. However, one may be concerned with both aspects, and thus use a social welfare indicator capturing both. For that purpose, we use a social welfare function from the so-called Atkinson-Kolm-Sen class (Atkinson, 1970; Kolm, 1966; 1976; Sen, 1973). A general social welfare function from this class takes the form of the product between the mean income (or other well-being metric of interest) and a distributional "correction factor" equal to one minus the scalar inequality index chosen. As in the previous section, we use the Atkinson inequality index with the inequality aversion parameter ε=1. Thus, the income- and equivalent income-based social welfare functions are $W=\mu(1-A_1)$ and $W^*=\mu^*(1-A_1^*)$, respectively.

We chose this particular social welfare function because its relative change over time can be straightforwardly decomposed into the respective contributions of income changes and changes in non-income dimensions.[16] Yet besides this important property, the social welfare function has an appealing normative property as well, at least to those who care about the equity aspect of social welfare and at the same time do not have extreme inequality aversion. It can be shown that the marginal social weight of a person implied by this social welfare function monotonically decreases as one moves from the bottom to the top of the distribution. Precisely, the marginal social weight of person i with income Y_i is $1/Y_i$. Since this person's contribution to social welfare is the product of her marginal social weight and her income, her contribution is $(1/Y_i)\cdot Y_i=1$, as it is for every other person. In contrast, for the social welfare function that does not take into account the equity

[16] This decomposition is shown below in this section; see equation (12).

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aspect, which is the case if it is equated with the mean income, $W=\mu$, a person's marginal social weight is equal to her income. Therefore, while $W=\mu(1-A_1)$ embodies the "one person, one vote" principle, $W=\mu$ embodies the "one euro, one vote" principle. In that sense, the former can be called "democratic". This carries over to the evaluation of growth in social welfare, while in the case of the "democratic" social welfare function everyone's growth is weighted equally in computing the overall growth, in the case of mean growth the weights are equal to incomes.

We first look at how much variations in means and inequality levels contribute to the cross-country variation in income- and equivalent income-based social welfare. We log-linearize W and W^*, and then decompose the variance of $\ln W$ ($\ln W^*$) into the respective contributions of variations in $\ln\mu$ ($\ln\mu^*$) and variations in $\ln(1-A_1)$ ($\ln(1-A^*_1)$). In the case of income-based social welfare, we have

$$\mathrm{var}(\ln W) = \mathrm{cov}(\ln \mu, \ln W) + \mathrm{cov}(\ln(1 - A_1), \ln W) \tag{10}$$

for levels and

$$\mathrm{var}(\Delta \ln W) = \mathrm{cov}(\Delta \ln W, \Delta \ln \mu) + \mathrm{cov}(\Delta \ln W, \Delta \ln(1 - A_1)) \tag{11}$$

for changes, while the corresponding expressions for equivalent income-based social welfare are obtained by replacing (W, μ, A_1) with (W^*, μ^*, A_1^*). The first term on the right-hand side of (10) is the contribution of cross-country variation in the mean, while the second one is the contribution of variation in the inequality-correction factor. Analogously, in (11) the contributions correspond to changes.

Decomposition results are shown in Table 2. The variance in $\ln W$ is almost entirely accounted for by variation in $\ln\mu$, with contributions of 94.5 (93.5) percent in 2007 (2011), respectively. Thus, countries differ much more in their mean incomes than in inequality. Variance of $\ln W^*$ is also predominantly explained by variation in $\ln\mu^*$, but less so than in the case of income-based social welfare: the contribution is 75.6 (71.2) percent in 2007 (2011). These results indicate that in cross-country comparisons of social welfare, the failure to take into account inequality differences is more important when individual well-being is measured by equivalent income. If one deems the equity aspect of social welfare important, then one should be more concerned with it when social welfare is based on equivalent income; that is, when well-being is measured multi-dimensionally. The following result comes from negative correlation between income and deprivations in non-income dimensions where on average, higher income is associated with better non-income dimensions, both among individuals and countries. Regarding the variance of growth in social welfare, the results are similar for income- and equivalent income-based social welfare.

TABLE 2

Decomposition of cross-country variance of levels and changes in social welfare

	Percent of variance due to variation in							
	ln μ	**ln(1-A_1)**	**Δln μ**	**Δln(1-A_1)**	**ln μ***	**ln(1-A_1*)**	**Δln μ***	**Δln(1-A_1*)**
Variance of:								
ln$W$ (2007)	94.5	5.5	-	-	-	-	-	-
ln$W$ (2011)	93.5	6.5	-	-	-	-	-	-
Δln$W$	-	-	83.8	16.2	-	-	-	-
ln$W$* (2007)	-	-	-	-	75.6	24.4	-	-
ln$W$* (2011)	-	-	-	-	71.2	28.8	-	-
Δln$W$*							81.2	18.8

Note: Decompositions are based on equations (10) and (11), multiplied by 100.

Income- and equivalent income-based social welfare are functionally related to each other. Taking the expected value of equation (8) for each country $c \in \{1, 2, ...,27\}$ and year $t \in \{2007, 2011\}$, and noting that for inequality aversion parameter $\varepsilon=1$ it holds that $E(\ln Y^*)_{c,t} = \ln W^*_{c,t}$ and $E(\ln Y)_{c,t} = \ln W_{c,t}$ we obtain

$$\ln W^*_{c,t} = \underbrace{\underbrace{\ln \mu_{c,t}}_{C(\mu)} + \underbrace{\ln(1-A_1)_{c,t}}_{C(A_1)}}_{C(W)} + \underbrace{\underbrace{\varphi_1 E(\text{UNE})_{c,t}}_{C(UNE)} + \underbrace{\varphi_{HEA}\,'E(\text{HEA})_{c,t}}_{C(HEA)} + \underbrace{\varphi_{HOU}\,'E(\text{HOU})_{c,t}}_{C(HOU)} + \underbrace{\varphi_{CRI}\,'E(\text{CRI})_{c,t}}_{C(CRI)} + \underbrace{\varphi_{ENV}\,'E(\text{ENV})_{c,t}}_{C(ENV)}}_{C(nonY)} \quad (12)$$

The corresponding expression for growth in equivalent income-based social welfare, $\Delta \ln W^*_c$, is obtained by subtracting (12) between two years, whereby the $C(X)$ terms turn into $C(\Delta X)$. By definition, $C(\mu)$ contributes positively, while $C(A_1)$, $C(UNE)$, $C(HEA)$, $C(HOU)$, $C(CRI)$ and $C(ENV)$ contribute negatively to $\ln W^*_{c,t}$. Here we are interested in how the cross-country variations in $\ln W^*_{c,t}$ and $\Delta \ln W^*_c$ are accounted for by the respective variations in their constitutive elements. For the purpose, we again use variance decomposition.

The results of variance decompositions are shown in Table 3. In both 2007 and 2011 the contribution of variation in non-income dimensions is larger than the contribution of variation in income-based social welfare, 60.7 *vs.* 39.3 (54.8 *vs.* 45.2) percent in 2007 (2011). Thus, if one is interested in cross-country differences in multidimensional and inequality-adjusted social welfare, one would miss a great deal by supposing that using only income-based social welfare amounts to using a good enough proxy. Such a practice may be reasonable if most of the variation in equivalent income-based social welfare were accounted for by the variation in income-based social welfare, which is not the case here. Omitting non-income dimensions would thus amount to neglecting a substantial, indeed dominant part.

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Table 3

Variance decomposition of equivalent income-based social welfare

Contribution to var(lnW^*)=100 or var(ΔlnW^*)=100 of variation in:	2007	2011	Change 2007-2011
1. $C(W)$ or $C(\Delta W)$	39.3	45.2	12.7
a. $C(\mu)$ or $C(\Delta\mu)$	36.7	42.3	10.3
b. $C(A_l)$ or $C(\Delta A_l)$	2.6	2.9	2.4
2. $C(nonY)$ or $C(\Delta nonY)$	60.7	54.8	87.3
a. $C(UNE)$ or $C(\Delta UNE)$	1.6	3.9	2.2
b. $C(HEA)$ or $C(\Delta HEA)$	31.4	31.1	41.7
c. $C(HOU)$ or $C(\Delta HOU)$	14.7	12.9	9.7
d. $C(CRI)$ or $C(\Delta CRI)$	3.8	0.8	13.5
e. $C(ENV)$ or $C(\Delta ENV)$	9.2	6.1	20.2

Note: Cross-country variance decomposition based on equation (12) and its version representing changes over 2007-2011.

Detailed decompositions reveal first that the contribution of income-based social welfare consists almost entirely of the contribution of mean income, a result in line with what we found earlier in this section. Regarding non-income dimensions, slightly more than half of their total contribution is due to health (31.4 (31.1) percent in 2007 (2011)). The contribution of housing comes as the second most important non-income dimension, with a contribution of about half that of health. Then come environment, crime and, the least important, unemployment. What these results indicate is that health is a non-income dimension that certainly should not be left out. Variations in income-based social welfare and health account for about 75 percent of the total variation in equivalent-income based social welfare. Adding housing, the proportion accounted for to about 85 percent. Thus, considering only two non-income dimensions along with income goes a long way to account for cross-country variation in equivalent income-based social welfare, above what can be accounted for by income-based social welfare only.

In Figure 5 we show how changes in income-based social welfare and non-income dimensions contributed to changes in equivalent income-based social welfare. The contribution of growth in income-based social welfare is negative for all countries, since the negative growth in mean income was nowhere fully offset by inequality reduction (see Table 3). With some exceptions, the sign of changes in non-income dimensions determines the sign of growth in equivalent income-based social welfare. Therefore, in countries where equivalent income-based social welfare increased, it did so due to improvements in non-income dimensions.[17] Moreover, in countries where non-income dimensions worsened, this reinforced the negative growth in income-based social welfare. The detailed decomposition reveals that the sign of the total contribution of non-income dimensions tends to match the sign of health contribution, underlining the importance of health. In all but one country unemployment worsened and thus contributed

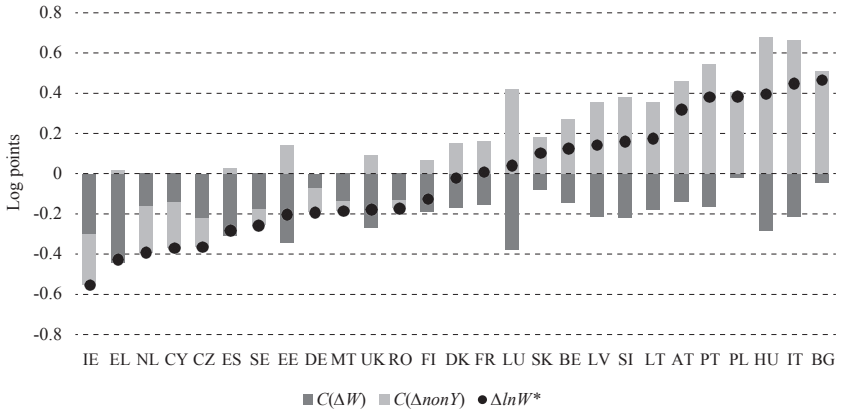
[17] Precisely, *net* improvements, since not all non-income dimensions necessarily improved.

negatively, while in most countries there were improvements in housing, crime and environment, as evidenced by their mostly positive contributions.

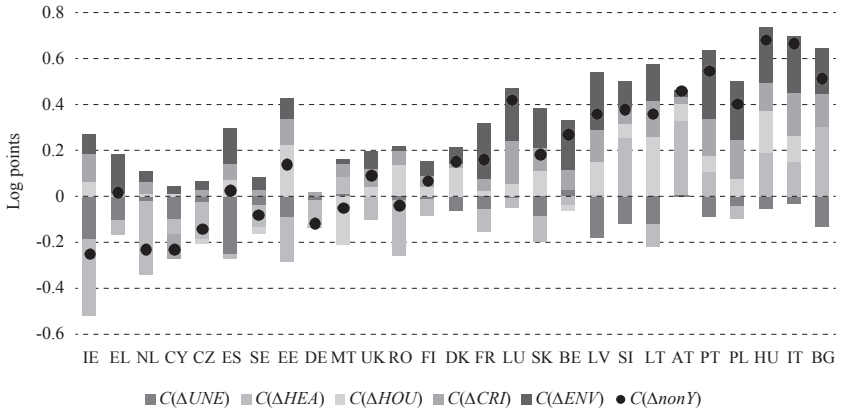
FIGURE 5

Decomposition of growth in equivalent income-based social welfare

a) ΔlnW = C(ΔlnW) + C(ΔnonY)*



b) C(ΔnonY) = C(ΔUNE) + C(ΔHEA) + C(ΔHOU) + C(ΔCRI) + C(ΔENV)



Note: Decomposition based on the version of equation (12) representing changes over 2007-2011 (see text).

Considering the contributions to the variation of changes in equivalent income-based social welfare, 87.3 percent of the cross-country variance is accounted for by the contribution of non-income dimensions (see Table 3). These results clearly testify to the importance of considering non-income dimensions. By far the largest contribution is that of health, followed by the contributions of environment, crime, housing and unemployment. Thus, the combination of health and environment, accounts for more than 60 percent of the total contribution of non-income dimensions.

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6 SUMMARY AND CONCLUSIONS

The objective of this paper was to explore empirically how well-being comparisons among countries at a point in time and over time depend on two different concepts of individual well-being. Using individual survey data for 2007 and 2011 for 27 EU countries, we compared results based on multidimensional well-being measured by equivalent income with those based on equating individual well-being with income. In constructing equivalent income, we combined income with five non-income dimensions, namely unemployment, health, housing, crime and environment. The relative weights of income and non-income dimensions are based on estimated "pan-European" preferences. We have made cross-country comparisons not only in terms of the average levels of income and equivalent income, but also in terms of inequality in their respective distributions and in terms of social welfare capturing both the averages (efficiency aspect) and inequality levels (equity aspect).

Our results and their implications can be summarised as follows. The ranking of countries in a given year by the mean equivalent income is very much in accordance with the ranking by mean income. Therefore, if one is interested in cross-country comparisons of the average well-being levels at a point in time, one hardly gets anything new upon switching from income to equivalent income. However, although the rankings are similar, the relative dispersion of mean equivalent incomes is considerably larger than that of mean incomes, indicating that countries are more similar to each other in terms of income than in terms of non-income dimensions. While the rankings by the means are very similar, this hardly holds for their growth rates. Not only the magnitudes of the growth rates but also their signs are different (i.e. some countries experienced an increase in mean income and decrease in mean equivalent income over the same period).

Equivalent income inequality is substantially higher than income inequality, a consequence of the income gradient of non-income dimensions and high sensitivity of equivalent income to shortfalls of certain non-income dimensions from their most favourable levels, especially in the cases of health and unemployment. Distributional issues are thus much more important when individual well-being is measured by equivalent income. Decompositions of equivalent income inequality reveal that in all countries the single largest contribution is that of variation in health status.

The ranking of countries by equivalent income inequality in a given year is substantially different from the ranking by income inequality. Thus, while the use of equivalent income instead of income hardly changes cross-country comparisons of the average level of well-being, comparisons of inequality levels change a great deal. This conclusion holds even more for cross-country comparisons of changes in inequality since there is only a weak correlation between percentage changes in equivalent income inequality and changes in income inequality.

Comparing countries in terms of social welfare by means of a social welfare function that captures both aspects of efficiency and equity is much more important when well-being is measured by equivalent income. Whereas income-based social welfare varies across countries almost entirely due to variation in the mean income, in the case of equivalent income-based social welfare the contribution of variation in equivalent income inequality is far from negligible. Therefore, considering equity when assessing social welfare is more important when individual well-being is measured by equivalent income.

Cross-country variation in equivalent income-based social welfare is more accounted for by variation in average levels of non-income dimensions than by variation in average income and income inequality. The contribution of health comes out as by far the most important. Leaving out non-income dimensions, especially health, would be to leave unexplained more than half of the cross-country variation in equivalent income-based social welfare. In accounting for the cross-country variation in growth of equivalent income-based social welfare, the contribution of variation in non-income dimensions is even more important. This indicates that ignoring non-income dimensions is more important for explaining differences in growth than in levels of equivalent income-based social welfare.

We see these results as providing evidence that it matters a great deal whether we look at well-being and its distribution through the unidimensional lenses of someone committed to taking income as individual well-being measure or through multidimensional lenses of someone who acknowledges the importance of going beyond income by considering non-income dimensions as well. We conclude that by disregarding non-income dimensions, and health in particular, and focussing solely on income, one effectively leaves a great deal of well-being differences – both among individuals and among countries –unexplained. The unidimensional picture of well-being painted by income is in many respects different from the multi-dimensional picture painted by equivalent income.

Disclosure statement

No potential conflict of interest was reported by the authors.

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TABLE A1

Number of observations per country and year

Countries	Year			
	2007		2011	
	N	% of total N	N	% of total N
AT	534	2.8	729	2.9
BE	713	3.8	734	2.9
BG	586	3.1	691	2.8
CY	683	3.6	586	2.3
CZ	749	4.0	708	2.8
DE	1,364	7.2	2,312	9.2
DK	772	4.1	841	3.3
EE	740	3.9	702	2.8
EL	702	3.7	658	2.6
ES	451	2.4	901	3.6
FI	774	4.1	852	3.4
FR	1,126	6.0	1,889	7.5
HU	686	3.6	690	2.7
IE	403	2.1	807	3.2
IT	484	2.6	1,407	5.6
LT	749	4.0	897	3.6
LU	484	2.6	650	2.6
LV	591	3.1	756	3.0
MT	528	2.8	474	1.9
NL	771	4.1	811	3.2
PL	936	5.0	1,632	6.5
PT	376	2.0	544	2.2
RO	638	3.4	1,148	4.6
SE	900	4.8	820	3.3
SI	650	3.4	623	2.5
SK	731	3.9	656	2.6
UK	778	4.1	1,599	6.4
	18,899	100.0	25,117	100.0

TABLE A2

Variable definitions and summary statistics

Variable name in life satisfaction model	Description	Reference (best) category for non-income dimensions	2007		2011	
			Mean	SD	Mean	SD
S	life satisfaction; integer scale from 1 (very dissatisfied) to 10 (very satisfied)	-	7.06	2.08	7.05	2.12
lnY	logarithm of household disposable income equivalized by the OECD equivalence scale	-	9.99	0.71	9.81	0.71
UNE	1 if unemployed; 0 otherwise	"non-unemployed": (self)employed, retired, students, other inactive	0.05	0.22	0.08	0.27
HEAvbad	1 if self-assessed health (SAH) very bad; 0 otherwise	SAH very good	0.02	0.13	0.02	0.15
HEAbad	1 if SAH bad; 0 otherwise	SAH very good	0.08	0.27	0.08	0.27
HEAfair	1 if SAH fair; 0 otherwise	SAH very good	0.27	0.44	0.28	0.45
HEAgood	1 if SAH good; 0 otherwise	SAH very good	0.41	0.49	0.4	0.49
HOUspace	1 if there is shortage of space; 0 otherwise	there is no shortage of space in dwelling	0.19	0.39	0.16	0.37
HOUrotten	1 if dwelling has rotten parts; 0 otherwise	there are no rotten parts in dwelling	0.13	0.33	0.10	0.30
HOUdamp	1 if there are damps or leaks in dwelling; 0 otherwise	there are no damps or leaks in dwelling	0.15	0.35	0.14	0.35
HOUbathtoil	1 if there is no bath or toilet in dwelling; 0 otherwise	there are both bath and toilet in dwelling	0.07	0.25	0.06	0.23
CRImoder	1 if moderate problems with crime or vandalism in the neighbourhood	no problems with crime or vandalism in neighbourhood	0.33	0.47	0.26	0.44
CRImajor	1 if major problems with crime or vandalism in neighbourhood.	no problems with crime or vandalism in neighbourhood	0.14	0.34	0.06	0.23

Variable name in life satisfaction model	Description	Reference (best) category for non-income dimensions	2007		2011	
			Mean	SD	Mean	SD
ENVwat	1 if any problems with drinking water in neighbourhood	no problems with drinking water in neighbourhood	0.36	0.48	0.22	0.41
ENVair	1 if any problems with air in neighbourhood	no problems with air in neighbourhood	0.44	0.50	0.26	0.44
male	1 if male; 0 if female	-	0.49	0.50	0.49	0.50
age	age in years	-	46.96	17.27	48.21	17.78
edulow	1 if low education (primary or less); 0 otherwise; reference: intermediate educ. (secondary)	-	0.10	0.31	0.10	0.30
eduhigh	1 if high education (tertiary); 0 otherwise; reference: intermediate educ. (secondary)	-	0.21	0.41	0.25	0.43
marrcoh	1 if married or in cohabitation; 0 otherwise; reference: single	-	0.67	0.47	0.54	0.5
divsep	1 if divorced or separated; 0 otherwise; reference: single	-	0.08	0.27	0.13	0.33
widow	1 if widowed; 0 otherwise; reference: single	-	0.09	0.28	0.12	0.32
urban	1 if living in urban area; 0 otherwise	-	0.24	0.43	0.25	0.43
child	1 if person has a child; 0 otherwise	-	0.75	0.43	0.69	0.46
trust	average of trust in people, legal system and police; 1-10 scale; higher value means higher trust	-	5.54	1.96	5.30	1.95

Note: The means and standard deviations are for all countries and only for the observations in the sample used for the estimation of the life satisfaction model.

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APPENDIX 2
INCOME RESCALING PROCEDURE

The rescaling procedure proceeds in four steps. First, using the Eurostat data on the decile shares in aggregate equivalized (by the OECD scale) disposable income and the mean equivalized disposable income, we calculate, for each country-year, the mean for each decile group, μ_d, using the fact that $\mu_d=s_d\mu$, where s_d is the decile share, and μ is the overall mean. In the second step, we divide the decile means μ_d by the corresponding decile means calculated from the EQLS data to obtain decile-specific rescaling factors for each country-year. Then we multiply all incomes in each of the EQLS decile groups for each country-year by the corresponding rescaling factors, to ensure that for each country-year the decile shares from the EQLS data are equal to those from the Eurostat data. Third, from the rescaled equivalized incomes, we recover the total rescaled household incomes, from which we calculate rescaled disposable household incomes per household member (rather than per adult equivalent). These are further rescaled by multiplying them by country-year-specific rescaling factors obtained as the ratio of the net national income (NNI) *per capita* (in purchasing power standard) to the mean disposable household income per household member. This ensures equality, between the NNI *per capita* and the mean disposable household income per household member. In the last step, we calculate new total disposable household incomes and divide them by the number of adult equivalents to obtain the disposable household income per adult equivalent. Finally, to convert nominal to real incomes, we divide them all by country-year specific consumer price indices (with 2005 as the base year). The income variable so obtained is the one we use in the analysis.

Upon applying the procedure, we have checked if the Gini coefficients calculated from the rescaled EQLS incomes match those obtained from Eurostat and found that almost all of the initial differences vanish (Figure A1). There is a concern that the rescaling distorts the original incomes too much, in the sense that the rescaling leads to substantial reranking among individuals (person A has higher income than person B before rescaling, but lower after rescaling). We computed the portion of the difference between the Gini coefficients for the original and rescaled incomes that can be attributed to reranking. We did that by performing the decomposition: $G_o-G_r=(G_o-C_r)+(C_r-G_r)$ where G_o is the Gini coefficient for the original incomes, G_r is the Gini coefficient for the rescaled incomes and C_r is the concentration index for the rescaled incomes with respect to the original incomes. The term (C_r-G_r) measures the reranking caused by the rescaling and we found that it is very small relative to the difference (G_o-G_r) (Figure A2), meaning that the rescaling spreads the income distribution without causing much reranking. We consider that a good enough indication that the rescaled incomes are not distorted too much and are thus reliable. Results are available on request. The more so given that not all respondents report the exact household income, but rather choose one of 21 intervals.

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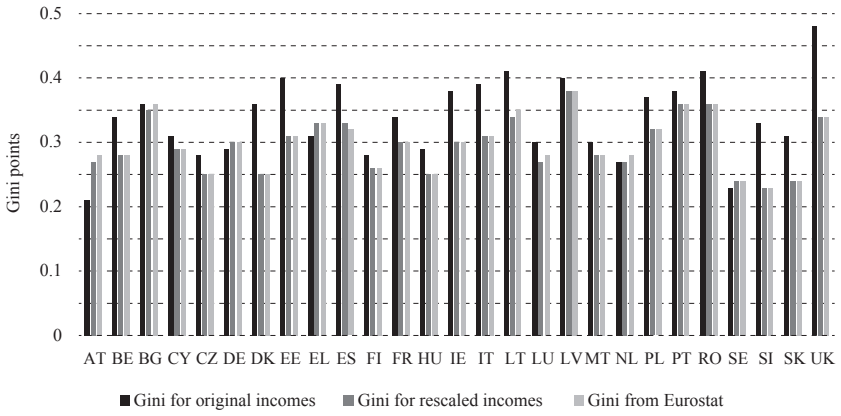
FIGURE A1

Gini coefficients for original and rescaled incomes

a) 2007



b) 2011

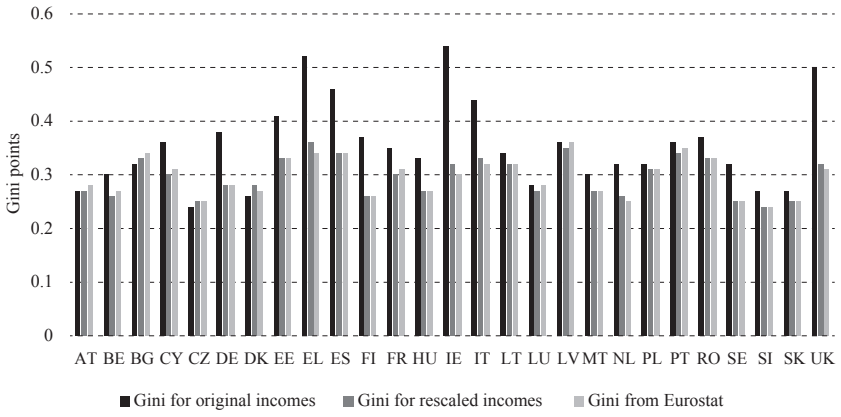
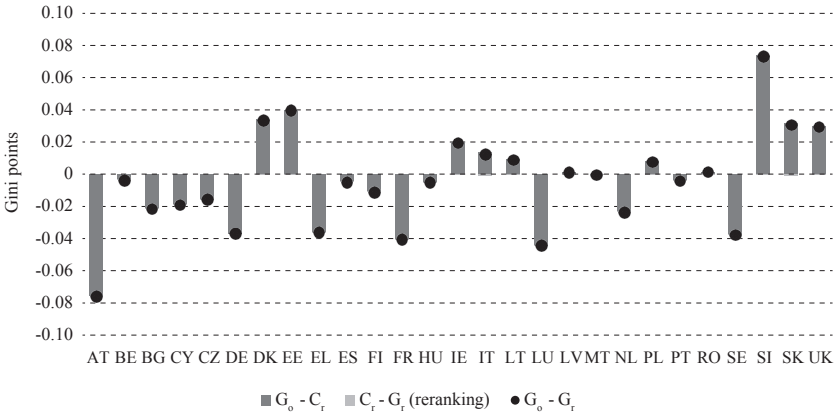


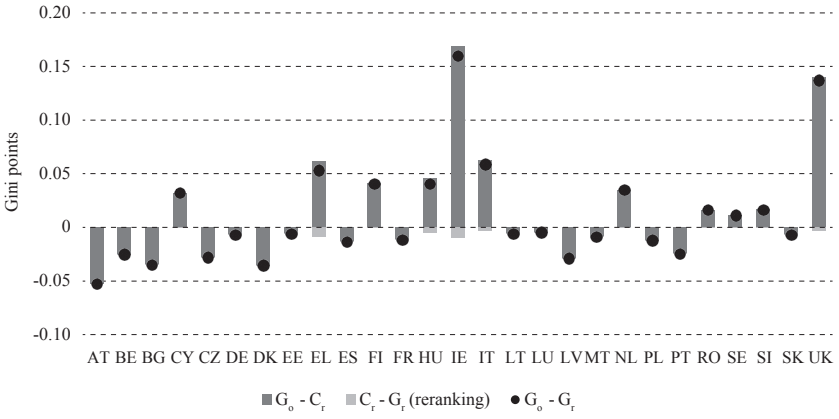
FIGURE A2

Decomposition of the difference between the Gini coefficient for original and rescaled incomes

a) 2007



b) 2011



Note: G_o = Gini coefficient for original incomes, G_r = Gini coefficient for rescaled incomes, C_r = concentration index for rescaled incomes. $G_o - G_r = (G_o - C_r) + (C_r - G_r)$. The term $(C_r - G_r)$ measures reranking caused by rescaling.

Inheritance and equal opportunity – it is the family that matters

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Abstract

Inheritance fundamentally violates the meritocratic justice principle of society. Despite the high level of wealth concentration and the fact that few people would be affected, political support for an inheritance tax is rather low. The topic of inheritance is not only about wealth but about values. We combine both by using questions in the Austrian Household Finance and Consumption Survey tailored to examine family values. The main aim of the paper is to bring sociological concepts and perceptions into the economic analysis of the role of inheritance in wealth distribution. We find several inconsistencies in people's perceptions concerning the relation of inheritance to issues of social justice. We argue that family values are decisive for negative perceptions of inheritance taxation. Our empirical evidence suggests that in order to understand the resistance to inheritance taxation in society better, family values have to be taken into account. The main aim of the paper is to deliver empirical evidence for bringing an interdisciplinary approach, including sociological concepts, into economic analysis when analysing the relationship between inheritance, wealth and taxation.

Keywords: inheritance tax, wealth distribution, Austrian Household Finance and Consumption Survey, Austria

1 INTRODUCTION

Most people do not question the practices of making and receiving bequests and inheritances. It seems to be natural that people should be able to dispose of their property by will. But still, inheritance taxation remains an ongoing issue attended by impassioned controversies (Beckert, 2004). Even though it is easy to justify an inheritance tax from a meritocratic point of view, it is a highly unpopular tax (Beckert, 2004; 2007).

In this paper we intend to contribute to a better understanding of this inheritance taxation puzzle. To do so, we explore perceptions on inheritance taxation in Austria based on the Austrian Household Finance and Consumption Survey (HFCS) and combine them with conceptual considerations.

The economic well-being of a household is influenced by private resources such as labour income, capital income and/or accumulated wealth. The family adds to that by bequests, gifts and non-monetary support. Finally, public welfare organized by the state contributes to the economic well-being of households. Inheritance has far reaching economic consequences for wealth accumulation (Arrondell and Masson, 2013). An increasing number of individuals receive inheritances, which account for a growing share in total wealth. Furthermore, these wealth transfers are heavily concentrated at the top of the distribution (see Piketty, 2014). The German sociologist Jens Beckert (2013) distinguishes four different principles used in public debates to question intergenerational wealth transfers or to legitimize inheritance taxation: the family principle, the equality of opportunity principle, the social justice principle and the community principle.

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The family principle claims that wealth of the testator is the property of the family and not of the individual. The equality of opportunity principles states that inequality is only justified on the foundation of differing achievements. The social justice principle seeks to correct unequal outcomes. The community principle focuses on promoting the common good. Philanthropical foundations provide an example of this principle.

Based on arguments of fairness and/or economic incentives a policymaker could justify higher taxes on inherited assets than on wealth accumulated *via* earnings and savings. However, whether the practice of inheritance is unjust can be judged from two completely different perspectives. In the familial context it might be legitimate. Family members take care of the needs and interests of one another. Giving gifts or inheriting assets is then just an expression of this view. In the context of society, however, the principles of merit and of equality of opportunity may point in the opposite direction.

As early as during the French revolution, the inheritance law aimed to alter family structures and bring equality. The issue was one of gender equality. The property law before had favoured men over women. Women have traditionally inherited less than men. Following the French revolution *primogenitur* was abolished. The family was described as the cell of the nation. A common adage from France reads: *toucher à l`heritage c'est comme toucher à la familie* [touching/striking the inheritance is like touching/striking the family] (Arrondell and Masson, 2013).

A culturally dominant view of the family is that it is a private sphere separated from public, economic and political spheres. While in the latter spheres it is interests that are dominant, in the family the needs of loved ones should be decisive. Actions should be motivated by love and only to a lower extent follow considerations based on moral or justice.

In the process of modernization, the structure of property changed in societies. In earlier societies the family owned the wealth jointly. It was not owned by single person. Therefore, when the father died no succession happened as the other members of the family still held the wealth. To speak of individual property delegitimized this way of passing wealth over generations. If we consider each family member as an independent wealth holder this brings up questions of testamentary freedom. Under testamentary freedom the wealth holder will decide on the posthumous disposition of the property. However, if we consider wealth as partly jointly owned by the family, restriction of testamentary freedom will clearly be entailed. Testamentary freedom is, then, curtailed by there being guaranteed shares for family members. This might run against the last will of the current wealth holder. But this lack of discretion strengthens the family unit.

In 1896 the Swedish economist Knut Wicksell (1896) distinguished the rights to bequeath and the rights to inherit. He argued (Wicksell, 1896: 111, quoted in Murphy and Nagel 2002:161):

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> From (the social) point of view the main thing to do would be to take energetic measures to prevent the unearned accumulation of riches (and with it mostly also their uneconomic use) which is now encouraged by law and custom.
>
> The only practical way to reach this goal appears to me to lie in the recognition that any right of inheritance, bequest or gift necessarily involves two parts. There is the right to give and the right to receive. These must strictly be distinguished and each treated on its own merit.
>
> To restrict the right to give more than is absolutely necessary even now often runs counter to our ideas of justice and equity and also may be seriously questioned on economic grounds.
>
> The right of inheritance taken in the second, and more proper, sense of the word as the unlimited right to receive must, if at all, be justified in quite different terms. Unless I am much mistaken, it rests on a now obsolete conception of social and family relationships.

This distinction between the perspective of the giver and the receiver is decisive from a justice perspective. It takes into consideration the freedom of private property and the right of society to use taxes and rules to regulate the inheritances received.

The remainder of the paper is structured as follows. Section 2 discusses theoretical considerations with regard to class analyses and equality of opportunity. Section 3 introduces the data. In section 4 we analyse empirically the link between social classes and inheritances well as ambivalences in perceptions. Section 5 concludes.

2 THEORETICAL CONSIDERATIONS

In this section we want to briefly elaborate the theoretical background we use in this paper. Subsection 2.1 introduces the concepts of class analysis used mainly in sociology we deem important for dealing with the economic relationships between inheritance, wealth and taxation. Subsection 2.2 discusses the concepts of equality of opportunity in the context of inheritance as these are key to understanding the perceptions of the population with regard to inheritance and inheritance taxation.

2.1 CLASS ANALYSIS IN THE CONTEXT OF INHERITANCES

We believe that the study of social classes in economics will get more attention in the 21st century than it received in the second half of the 20th century. Historically Karl Marx understood capitalism as a system of social relations. His focus was on the production side. A class arises out of certain production relations. Thus, his emphasis was on property relations and the organization of the labour process.

Wright (2009) distinguished three forms of class analysis. First, in sociological stratification research classes are identified with attributes and material life conditions of people. Second, in the Weberian perspective the focus is on the ways in

which control is exerted over economic resources. Third, the Marxian approach focuses on mechanisms of exploitation.

To specify social classes sociology uses employment and occupation criteria. Wolff and Zacharias (2013) suggest rather a specification of capitalist households based on wealth thresholds. Fessler and Schürz (2020) argue that classes should be distinguished not only by the absolute wealth level but also by functions of wealth and the dominance of different sources of income. Renters mainly earn income from selling their labour. Owners additionally have some non-cash income by living in their own home (imputed rent) and capitalists own businesses or rent out real estate and therefore own capital as a means of production.

One question we ask is the following: does the very probability of receiving an inheritance create a common understanding of equality of opportunity?

In a class society the interests of one class are opposed to those of another class. But does a class share common values? We study the centrality of class in the field of inheritance. We assume that renters – as they inherit less than the two other classes – tend to be in favour of an inheritance tax.

However, the moral compass does not follow class frontiers (Schürz, 2019). We observe partly culturally shared perceptions and justice judgements in the HFCS data. Another related research question we pursue is the following: does the equality of opportunity principle provide a shared principle of justice?

A conception of justice compatible with capitalism and democracy is hard to find as Murphy and Nagel argue. Murphy and Nagel (2002:3) start their philosophical contribution "The myth of ownership" by stating: "In a capitalist economy, taxes are not just a method of payment for government and public services. They are also a the most important instrument by which the political system puts into practice a conception of economic or distributive justice".

Inheritance taxes have lost a lot of popular support over the last decades. Distributive justice cannot be understood in terms of the equality of opportunity principle alone. The focus on responsibility and choice is rather complementary to justice considerations of the results.

Equal libertarianism "implies that, in the absence of other reasons to the contrary (a very large qualification), gratuitous receipts should be confiscated by the state and redistributed equally among all persons" (Murphy and Nagel, 2002:155) The approach of equal libertarianism is not shared by many people.

We show that despite a class structure of society along the lines of wealth inequality there is a missing common idea on inheritance taxation. Wealth inequality is a social phenomenon to be studied *via* social classes. But a rethinking of the class

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concept in a highly complex environment is required. Perceptions of inequality and judgements about justice do not follow a social classification.

2.2 EQUALITY OF OPPORTUNITY IN THE CONTEXT OF INHERITANCES

The extent to which wealth is transferred from one generation to the next affects the principle of equal opportunity. The American philosopher John Rawls gives equality of opportunity an important place in his two principles of justice: Rawls (1971:302) defined what he called "fair equality of opportunity" as,

> those who are at the same level of talents and ability, and have the same willingness to use them, should have the same prospects of success regardless of their initial place in the social system, that is, irrespective of the income class into which they are born. In all sectors of society there should be roughly equal prospects of culture and achievement for everyone similarly motivated and endowed.

Rawls claims, that two children of equal ability should have an equal chance to develop their skills regardless of their social background. If a child inherits wealth from his parents while another one does not, this implies obviously an inequality in material circumstances.

Family is a central transmitter of advantages and disadvantages. „Even in a well-ordered society that satisfies the two principles of justice, the family may be a barrier to equal chances between individuals" (Rawls, 1971:301). He continues "the principle of fair equality of opportunity can be only imperfectly carried out, at least as long as the institution of the family exists."

Further prominent philosophers have dealt with this issue. The question of David Miller from the University of Oxford is: "is it possible for equality of opportunity and family to coexist" (Miller, 2013:116). He distinguishes two forms of equality of opportunity (ibid:118): a minimal version that does not take into consideration background factors of persons and a maximal version of equality of opportunity that reaches from education to talents. What causes of inequality we think are morally arbitrary? For Murphy and Nagel (2002:57) such clearly unacceptable sources of inequality are first a "deliberately imposed caste system", but also a "hereditary class stratification".

3 DATA

We use two waves (2014 and 2017) of the Austrian Household Finance and Consumption Survey in which we introduced additional questions tailored to study the process of inheritance more deeply. This household survey is based on personal interviewing of a representative household sample.

In 2006, two years before the global financial and economic crisis unfolded, the European Central Bank (ECB) initiated the Household Finance and Consumption Network (HFCN) comprising survey specialists, statisticians, economists from

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the ECB, the national central banks of the euro system and several national statistical institutes. The HFCS collects harmonized household balance sheet data for the euro area. It is the only set of household-level data for the joint analysis of wealth, income and consumption. Moreover, the HFCS provides information on numerous socioeconomic variables and on perceptions[1].

In this paper we use the HFCS Austria 2014 and the HFCS Austria 2017. Both waves are based on a stratified multistage clustered sample of Austrian households. The reason for using two waves of the HFCS is merely the availability of certain questions. All data are gathered by Computer Assisted Personal Interviewing. Unit non-response is dealt with by non-response weights which are based on information also gathered about all non-respondents. Additionally, design- and poststratification weights are calculated to end up with weights to represent the Austrian population of private households. Item non-response is dealt with by means of multiple imputation. We use an iterative Bayesian approach using chained equations where item non response is modelled in a joint framework. For each missing value 5 imputations are produced to take into account uncertainty of the imputation process. Rubin's Rule is then applied to all calculations in this paper, which all take into account complex survey population weights as well as multiple imputations.

The 2014 wave comprises 2,997 observations (gross sample of 6,308) representing about 3.8 million households. The response rate was 50%. The 2017 wave comprises 3,072 observations (gross sample of 6,280). The response rate was 49.8%.[2]

4 INHERITANCE WITHIN A FRAMEWORK OF CLASS ANALYSIS

Since 2008 there has been no inheritance tax in Austria. Before 2008 inheritances were progressively taxed depending on the relationship of the receiver of the inheritance to the donor of the inheritance. The categories were (1) married partners/children, (2) grandchildren and grand-grandchildren, (3) parents, grandparents and siblings, (4) nieces, nephews, (5) all others. Tax rates increased from 2% to 60%. The level of the tax rate depended on several parameters: the absolute value and relationship category. The rate was then applied to the inherited sum above a certain threshold, which was also dependent on the relationship category itself. All in all, it strongly favoured inheritance within the close family.

As inheritance is an intergenerational matter and wealth is accumulated over (many) generations it is directly linked to class location. In section 4.1 we present empirical evidence on the relation of inheritances and net wealth (by age). In a second step we analyse inheritance through the lenses of social classes in section 4.2.

4.1 HEIRS *VERSUS* NON-HEIRS

Figure 1 shows that receiving bequests is not only a question of age using a binned scatter plot. Inheritances do not depend alone on the fact that people are getting

[1] See Household Finance and Consumption Survey (HFCS).
[2] See the methodological reports for details: HFCS Austria 2017.

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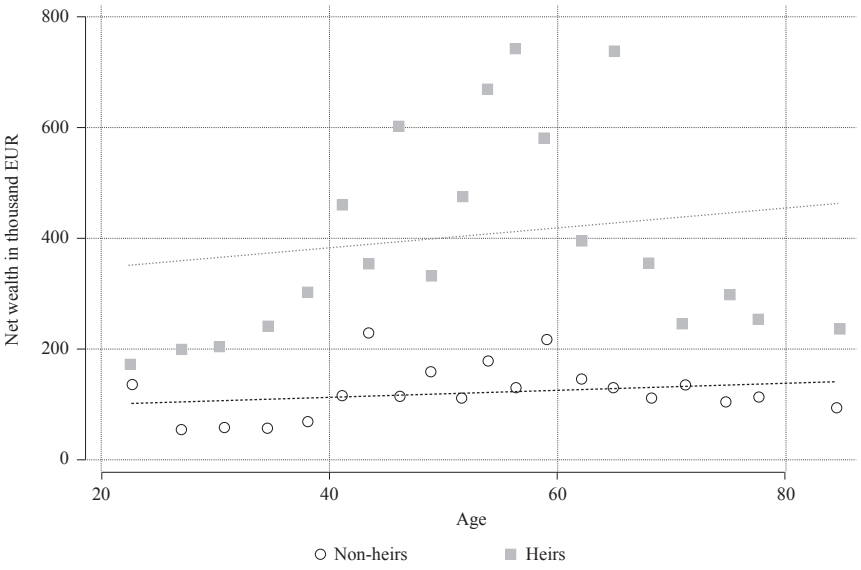
older and later all of them will receive some inheritance. At every age heirs have more net wealth than non-heirs. In particular, in the age group of 50 to 60 years the difference among both groups is substantial.

Figure 1

Net wealth across age by heirs and non-heirs



Source: HFCS Austria 2017.

Perceptions and preferences are crucial for understanding individual economic behaviour. But perceptions do not necessarily depend on socioeconomic factors. Figure 2 shows answers to three HFCS-Austria questions on views and preferences of respondents related to wealth:

– Do you think that it is possible to start poor, work hard and become rich in Austria?
– Inheritance tax was abolished in Austria in 2008. Are you in favour of re-introducing inheritance taxation in Austria?
– Are you in favour of introducing a wealth tax?

The first question can be understood as a variant of the equality of opportunity principle. About 43% think that it is possible to start poor and get rich through work. However, while this share is about 30% for households in the lowest wealth quintile it rises to almost 60% for households in the highest quintile (not shown). Most of the respondents (57%) do not believe that it is possible to start poor and become rich. In particular, experience teaches people that life is usually not a variant of the American Dream. But people with higher incomes believe twice as strongly in meritocratic principles. Implicitly they understand their own economic success as deserved by merit. Interestingly people in households that have received an inheritance also

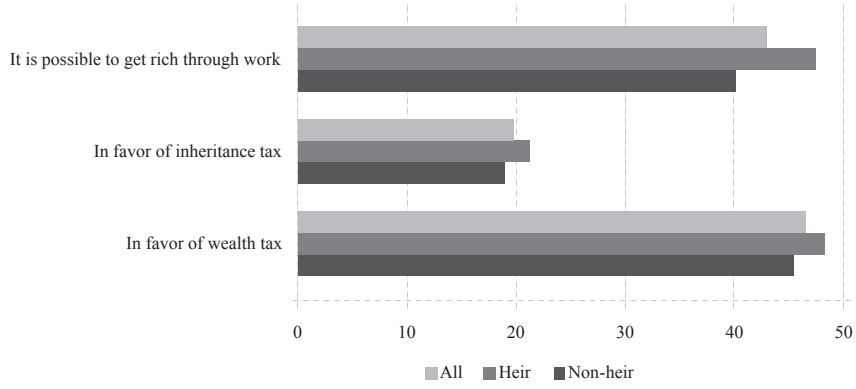
say that one can become rich through work more often than those that have not inherited anything. Of all heirs, 47% believe in this understanding of the equality principle. Inheritances are wealth transfers without merit of the recipient. This indicates that no rational pattern of merit is to be found in the judgements.

The second and the third question focus on the preferences related to taxation of wealth. We do not know anything about the likely reasons for their preferences. But about 46% of respondents are in favour of a wealth tax. While the share is above 50% in the lowest wealth quintile, acceptance decreases to below 45% in the 5th quintile (not shown). For Austria this is astonishing. The median of household net wealth is 83,000 EUR. No political party in Austria has ever argued for a wealth tax with a threshold below 100,000 EUR since tax was abolished (the inheritance tax was abolished in 2008; the general tax on net wealth was already abolished in 1993). Thus, a rational concern for having to pay a new tax cannot explain these preferences.

Only about 20% of the reference persons would support the re-introduction of an inheritance tax.[3] Interestingly this result is rather stable across all wealth quintiles (not shown). The rank in the wealth distribution is not decisive for normative judgements on wealth taxes. Issues of justice are not a priority in perceiving wealth inequality (Schürz, 2019).

Figure 2

Attitudes towards getting rich and wealth taxation (in %)



Source: HFCS Austria 2017.

Figure 3 illustrates – again using a binned scatter plot – that the differences between heirs and non-heirs regarding their attitude towards getting rich through work is not present across different levels of income. While the share of individuals believing in the possibility of getting rich through work rises with income, those who have already inherited something show (on average) a much stronger acceptance of this idea even within similar income groups including the lower income groups.

[3] We use the financially knowledgeable person – who answers all household level questions in the HFCS – as a reference person.

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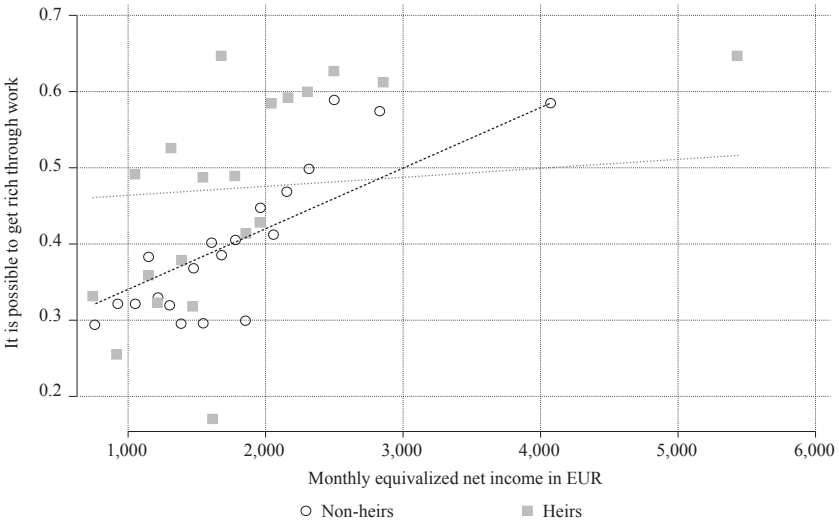
FIGURE 3

Attitude toward getting rich through work across income by heirs and non-heirs



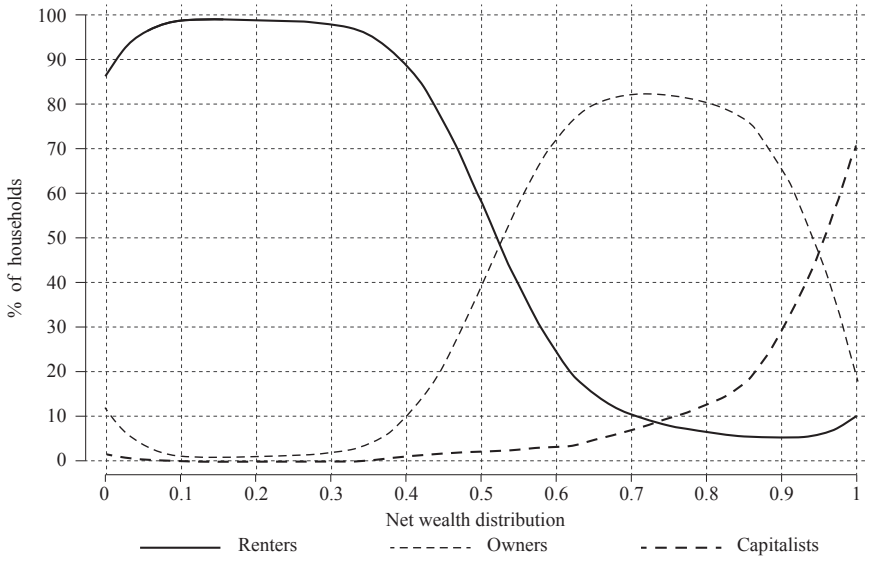
Source: HFCS Austria 2017.

4.2 INHERITANCE AND CLASS

In a recent working paper, we emphasize the advantages of a relational class-based approach (see Fessler and Schürz, 2018b) when analysing wealth inequality. By distinguishing three classes our analysis sheds light on the social relationships underpinning wealth. The functions of wealth are very different for people at the bottom (who mainly save for precautionary reasons), in the middle (who mostly hold wealth for its use value, in the form of home ownership), and at the top (who hold business wealth) of the wealth distribution (see Figure A1 in the Appendix). We define renters, who do not generate substantial income from wealth, owners, who generate non-cash income in form of the imputed rent by owner occupation, and capitalists, who are owners who additionally generate cash income from wealth by renting out further real estate and/or directly owning a private business. We find that these classes align well with the distribution of wealth.

Figure 4 shows the class locations for social classes in Austria. But also, in the euro area as a whole and in every single euro area country this pattern emerges and renters are dominantly located in the bottom, owners in the middle and capitalists at the top of the wealth distribution. At the same time, the two points in the wealth distribution where there are more owners than renters and - at a higher wealth level - more capitalists than owners vary considerably across countries. We argue that this is mainly a result of institutional differences (see Fessler and Schürz, 2018b).

Figure 4
Class location across the distribution of net wealth



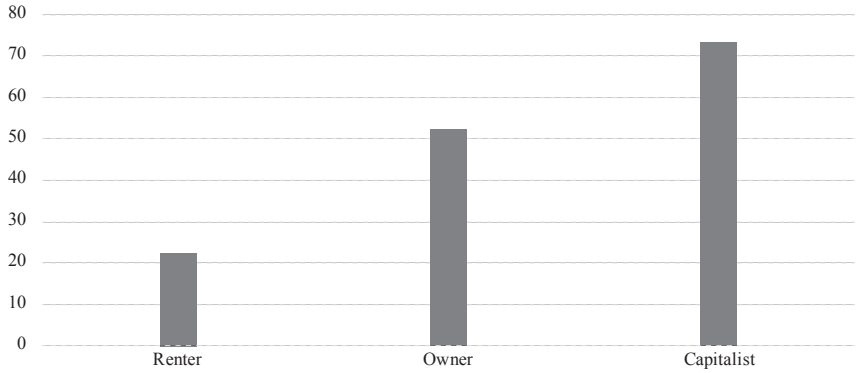
Source: HFCS Austria 2017.

Recent preliminary results for the UK suggest a different picture. They show the UK's way to become a nation of homeowners (see Fessler and Schürz, 2020). The cohort of people that became homeowners in the 1980s is still living and will transfer their real wealth later. That is why the pattern differs a lot from countries in continental Europe and the owners stay dominant up to the very top of the wealth distribution.

Figure 5 shows the share of heirs across classes. In the class of capitalists, the share of heirs is more than three times as large as in the class of renters. More than 70% of capitalists have already received an inheritance. This suggests that class persistence across generations might be closely related to inheritance. And obviously, it is not the case that inheritance plays a small role for "self-made" entrepreneurs.

Figure 5

Share of heirs across class (in %)



Note: The overall share of heirs amounts to 37.9% of all households.

Source: HFCS Austria 2017.

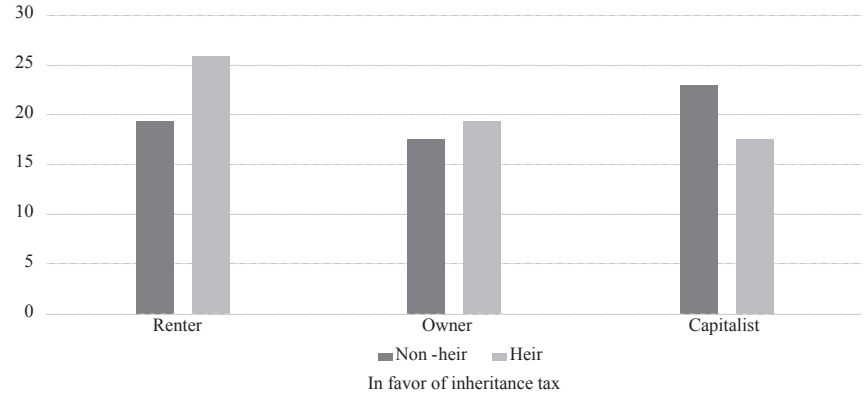
But normative judgements do not follow class patterns and do not show a consistent picture. As Figure 6 illustrates it is not the case that capitalists are less in favour of inheritance taxation despite their higher share of heirs than in the case of renters. And heirs in the group of owners of their main residence are more in favour of an inheritance tax than non-heirs in the same group.

Among the social groups the rates of those in favour of inheritance taxation look rather similar. Within the group of renters (the group with the lowest level of net wealth) a household that has already inherited wealth shows the strongest support of an inheritance tax.

While for the capitalists the experience of an inheritance goes along with lower support of the tax, for the renters in the lower part of the wealth distribution it is just the other way around.

Figure 6

Attitude towards inheritance taxation across class (in %)



Source: HFCS Austria 2017.

One reason for such differences could be different timings of inheritances for the three classes and related expectations about future inheritances. As one can see in Table 1 that is not the case. Capitalists are strong in the inheritance groups including those that still expect an inheritance. The same is true for owners. Renters who inherit are relatively stronger in the group of those that still expect an inheritance than in those that do not but still show the strongest support for the tax. With regard to capitalists it is the other way around, even though they show the least support for the tax. Generally, renters that have not received an inheritance form an over-proportional share of the group that expects one (other than for owners and renters). Also, renters who expect an inheritance show stronger support for the tax than owners who expect one. After having already received an inheritance and without expecting another one a utility maximizing behaviour would suggest being in favour of the tax, while having not received one yet but still expecting one should favour attitudes against a tax. Clearly these attitudes are not driven by such rational ideas.

Table 1

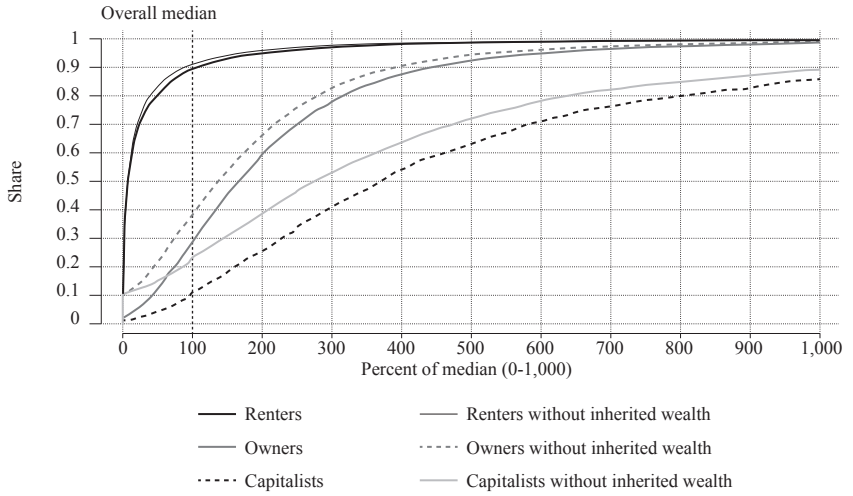
Inheritance received and inheritance expected across class (Austria)

	Renters	Owners	Capitalists
No inheritance and none expected	0.63	0.33	0.04
No inheritance but expected	0.77	0.21	0.02
Inheritance and none expected	0.32	0.52	0.17
Inheritance and expected	0.43	0.42	0.15

Source: HFCS Austria 2014.

By showing the cumulative wealth distribution functions for the different classes by inheritance received, Figure 7 illustrates that across all wealth levels heirs have more wealth than non-heirs.

FIGURE 7
Distributions of wealth with and without inheritance across class



Notes: (i) This graph shows the cumulative distribution functions of wealth as well as the CDFs of wealth without inherited wealth of renters, owners and capitalists in the euro area. Both are normalized with the overall median of net wealth. (ii) To produce wealth without inheritance, inherited main residences as well as the 3 largest other potential inheritances of the household were considered. To estimate a present value an average yearly nominal interest rate of 6% was used. We use this assumption because there are no time series of consumer price indices available for all countries that are long enough for the construction of meaningful real interest rates. However, they likely translate to real interest rates of 2 to 4%. The sum of present values of all inheritances was subtracted from net wealth to obtain wealth without inherited wealth.

Source: HFCS Austria 2014.

Especially for capitalists the impact on class location is very strong. Without inheritances more than about 20% (instead of approximately 10%) of the capitalists would show wealth levels below median wealth. For owners this figure is about 40% (instead of around 30%). For renters the effect on class location is marginal. So even though for a single renter household an inheritance might be substantial (given the low amounts of wealth they have), even relatively more important than for the typical capitalist household (relative to their high amounts of wealth), class location is not affected. In terms of relative class locations inheritances are rather important for capitalists and to a lesser degree for owners but rather irrelevant for the class of renters.

Despite all rational reasons which would lead to the expectation that individuals should be in favour of inheritance taxation a vast majority in the overall population and even across all classes are against them.

Using locally weighted regressions to estimate shares across the income distribution, Figure 8 shows the sentiment of family values even among those persons in favour of an inheritance taxation. After stating that they are in favour of such a tax,

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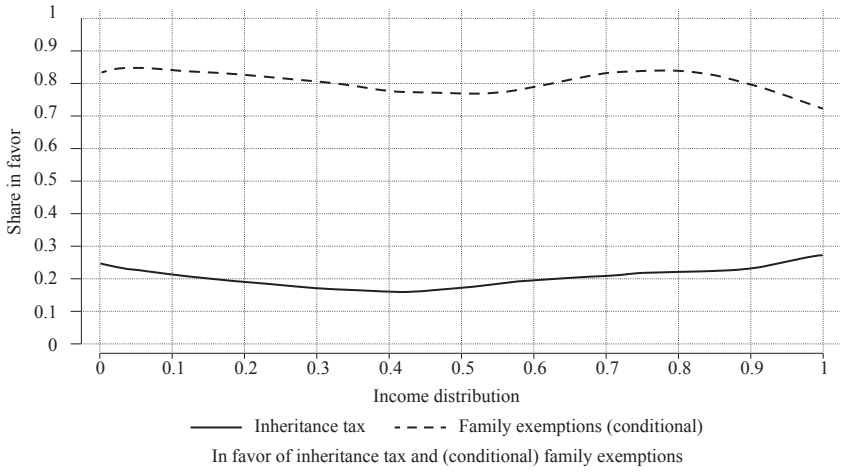
they are asked about preferred exemptions and a vast majority are in favour of family exemptions if an inheritance tax were reintroduced. This means that among the few who are in favour of a tax more than 80% (rather stable across the income distribution) want to have exemptions from the tax for families.

Figure 8

Attitude towards inheritance tax and family exemptions



Source: HFCS Austria 2017.

5 CONCLUSIONS

The legal privilege permitted to the intergenerational transmission of property within families is rarely questioned. Differences in social background and related monetary advantages such as inheritances prove that not every member of society has a fair chance of earning a specific rank in the wealth distribution.

We have enriched the discussion of the justification of inheritance taxation by empirical evidence of perceptions and people's normative judgements. As perceptions related to a taxation of inheritance remain ambivalent this leads us to the conclusion that justifications of inheritance themselves are ambiguous. Arguing in favour of a social justice principle or an equality of opportunity principle does not imply that the acceptance of societal concerns as being more important than family values. In order to increase the acceptance of inheritance taxation in the public, family concerns must be dealt with explicitly. The value of the family runs a lot deeper than economic motives. And family values rank higher than justice judgments. Our results demonstrate the necessity of further interdisciplinary research. The theoretical conclusion of these empirical results is that the institution of the family must be placed at the centre of a theory of social justice (Miller, 2013). Perceptions of the family - as a place to be preferred in society - block equality of opportunity concerns. The equal opportunity approach provides no coherent ideal

in a society and it is to be doubted whether family concerns and equality of opportunity can be reconciled.

Disclosure statement
No potential conflict of interest was reported by the authors.

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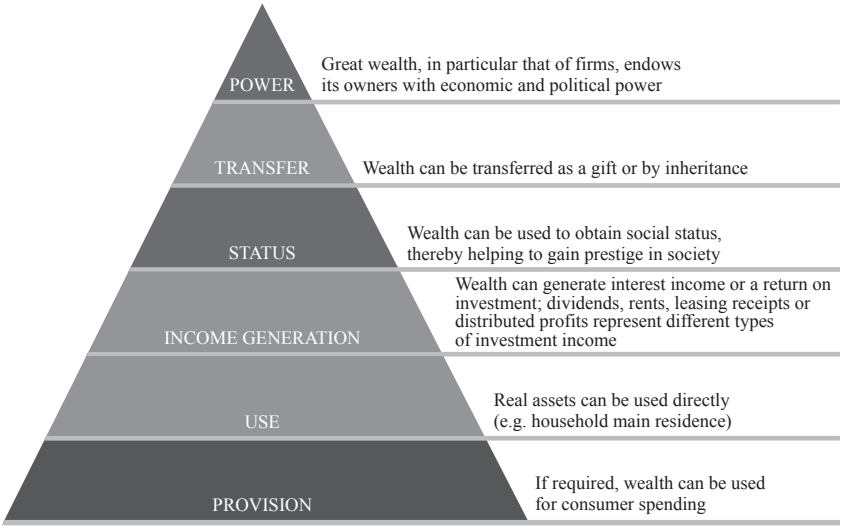
FIGURE A1

Functions of wealth



Source: Own illustration.

Immovable property: where, why and how should it be taxed? A review of the literature and its implementation in Europe

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Article**
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Abstract

This paper surveys the literature on immovable property taxation along two dimensions prevalent in the literature: i) according to the type of real estate over its life-cycle and ii) according to the type of tax. The first strand of the literature agrees that immovable property taxation should be neutral to avoid distortionary behaviour vis-a-vis other assets/consumption goods. However, the neutrality benchmark and hence taxation to be chosen depend on the theoretical view taken. The second strand assesses one type of property tax at a single point in time with respect to the considerations of efficiency, equity, fiscal federalism and political economy. Most of this strand of the literature focuses on recurrent property taxation on residential property, which has a lot of theoretical merits. A key message of both strands is that reaping the theoretical merits of immovable property taxation in practice is hindered by tax design issues and political economy issues.

Keywords: immovable property taxation, recurrent property tax, owner-occupied housing

1 INTRODUCTION

Immovable property has been taxed since the Middle Ages (Almy, 2013), which explains its long tradition in public finance. Public finance economists have analysed the taxation of immovable property with respect to the considerations of efficiency, effectiveness, equality, budgetary and political economy. Recently, the analysis has been extended to assess its fit as a macroprudential policy tool to affect the housing market, given the role of the housing market in the wake of the economic and financial crisis (Kuttner and Shim, 2013; ESRB, 2015; Fatica, 2015). Furthermore, international institutions such as the European Commission and the OECD seem to prefer immovable property taxation over other forms of taxation, as they keep requesting a tax shift from labour to immovable property taxation.[1]

The goal of this paper is to provide a non-technical overview of the most relevant aspects of immovable property taxation found in the literature and applied in Europe. The large amount of literature on the tax treatment of immovable property is classified along new dimensions. The paper innovatively reviews the literature on immovable property taxation along two lines: The first review category comprises literature that deals with the taxation of specific property items over their whole life-cycle, such as the taxation of owner-occupied housing. It highlights the distortions property taxation introduces to housing investment and consumption decisions compared to other assets/consumption goods. The second category considers the literature that assesses the vices and virtues of one particular tax on immovable property (at one particular point in the life-cycle), such as recurrent

[1] The economic argumentation was laid down in Annex IV of the AGS 2012 (EC, 2011). Since then different member states have received the country specific recommendation to shift taxes away from labour to (recurrent) property taxation; e.g. AT in 2013 and 2014. The OECD recommends this shift in its country reports, e.g. for AT in 2017.

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property taxation. The paper hence gives a systematic overview of the literature on immovable property taxation according to either i) the type of real estate or ii) the type of tax, highlighting the most important findings in the two different strands of the literature. Moreover, it also describes some of the key features of housing taxation in the EU.

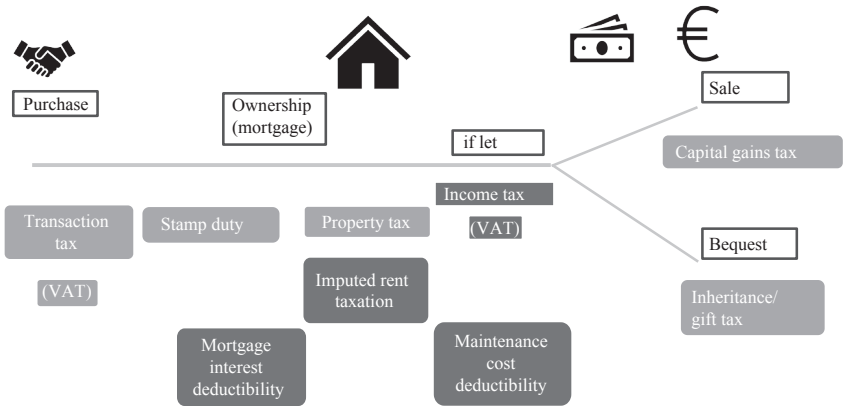
The focus of the survey on distortionary and efficiency considerations of immovable property taxation follows directly from the available literature. Other aspects such as equity, fiscal federalism and political economy considerations, while present over a long time, have attracted less attention. Moreover, as empirical literature on housing taxation is scarce in Europe, empirical results throughout the paper also refer to the US, which serves as an indicator of the order of magnitude for Europe.

The paper is structured in three main parts. Section 2 serves as an introduction to the topic: it recalls all taxes that are possibly levied on immovable property and defines the terminology used in the remainder of the paper. Moreover, it also discusses briefly the current use and design of these taxes in EU member states. Sections 3 and 4 review the main economic arguments and empirical results in the literature: Following the two different strands identified, section 3 deals with the taxation according to the type of real estate over its life-cycle, while section 4 provides an overview of the literature according to the specific type of immovable property tax. Section 5 concludes. A key message is that while literature attributes a lot of theoretical merits to immovable property taxation, practical tax design issues and considerations of political economy make it difficult to reap its merits in practice.

2 IMMOVABLE PROPERTY: WHEN/WHERE/HOW IS IT TAXED IN THE EU?

Before classifying the literature on immovable property taxation, a natural starting point is to recall where in its life-cycle immovable property is actually subject to which kind of tax. Graph 1 gives an overview of the most common immovable property taxes applied in the EU over the object's life-cycle. It starts with taxes due at first purchase for an owner, ending with the object's transfer to a new owner, when the object's life-cycle – and tax liabilities – starts again. Taxes generally falling on stock variables are denoted by solid frames, while those on flow variables are represented by dashed frames in Graph 1.

Figure 1
Taxation of immovable property over its life-cycle



Source: Own representation.

2.1 TAXES ON THE PURCHASE OF IMMOVABLE PROPERTY

The purchase of immovable property is subject to a property transfer tax in almost all EU member states (exceptions EE, LT, SK). As indicated by the solid frame in Figure 1, this tax is usually based on a stock, namely the value of the property, typically measured by (some share of) the transaction price. Maximum statutory tax rates reach up to 12.5% of the transaction price, as in Belgium (see Table 1), with various exemptions and deductions for first time buyers, permanent residences or small/inexpensive property. New buildings are subject to VAT based on the transaction price in most EU member states, which sometimes replaces the property transfer tax (Italy, Cyprus, Slovenia, Poland, Spain). In addition, all EU member states levy some kind of stamp duty linked to the legal recognition of the immovable property transfer and its registration. This stamp duty is either levied as a (low) percentage of the transaction price – in which case it presents a tax on a stock – and/or a fixed nominal amount. If the acquisition of immovable property is financed by a mortgage, the stamp duty is sometimes increased by a share of the loan value (for example, in Austria, the additional stamp duty amounts to 1.2% of the mortgage value).

Table 1

Tax rates on residential property in the euro area, in %

	Maximum statutory tax rate on residential property		Implicit tax rate
	Property transfer	Capital gains	Recurrent property tax (tax revenues/ dwellings stock)
Belgium	12.5	16.5	0.690
Germany	6.0	30.0	0.130
Estonia	no	income tax rate	no
Ireland	2.0	30.0	0.180
Greece	3.1	suspended	0.770
Spain	10.0	23.0	0.340
France	5.8	36.2	1.350
Italy	9.0	20.0	0.410
Cyprus	8.0	20.0	0.220
Latvia	22.0	20.0	0.100
Lithuania	no	income tax rate 15.0	0.080
Luxembourg	10.5	income tax rate	0.070
Malta	5.0	8.0	no
Netherlands	2.0	no	0.600
Austria	3.5	30.0	0.030
Portugal	8.0	29.0	0.360
Slovenia	2.0	25.0	0.160
Slovakia	no	income tax rate	0.160
Finland	4.0	34.0	0.290

** Main residences are gewnerally not subject to capital gains taxation.*

Source: Own representation based on National Ministries of Finance; Barrios et al.(2019) and Fatica and Prammer (2018) for implicit tax rates.

2.2 TAXES DURING THE OWNERSHIP OF IMMOVABLE PROPERTY

The ownership of an immovable property is subject to recurrent property taxes.[2] The basic case of a recurrent tax on residential property is a flat rate which is levied on the cadastral value[3] by local authorities. Some, particularly new, member states levy surface based local property taxes (Brzeski, Románová and Franzsen, 2019). Only a few member states, namely Croatia[4], Malta, Estonia and Italy[5] do not levy recurrent property taxes. Despite their widespread use, the revenue from recurrent taxes on immovable property is rather low, amounting to only 1.6% of GDP in the EU on average in 2017 (EA-average: 1.3% of GDP). This is due to the use of the cadastral values as the tax base, which often fall short of up-to-date market values. Cadastral values in Germany and Austria are particularly outdated – stemming from the 1960s and 1970s, respectively.[6] Hence, the effective

[2] For the economic discussion on recurrent property taxes, the reader is referred to section 4.1.
[3] The cadastral value of a property refers to the value of the land and buildings as recorded in the land register for tax purposes.
[4] However, in Croatia a so-called 'communal fee' on properties based on its surface is levied.
[5] Italy does not levy recurrent property taxes on the primary residence since 2017.
[6] Following a constitutional court ruling Germany has to adjust its cadastral values by the end of 2019.

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recurrent property tax rate is well below 0.5% in the euro area (see Table 1 and Fatica and Prammer, 2018), despite the considerably higher statutory tax rates. An alternative to recurrently taxing the stock of immovable property is a tax on imputed rents. In this case a tax is levied on the fictive flow of rental income (dashed frame in Figure 1) – usually by adding it to other income categories; it is, however, currently only applied for main dwellings by the Netherlands.[7]

The case for a tax on the flow of rental income is clear cut, if the owner rents out the property and earns actual rental income. This income is subject to some kind of income taxation in all EU member states. VAT might be levied on the rent – for private rents often subject to a turnover threshold; generally private rents are subject to reduced VAT rates. If a private purchase of the immovable property is financed by a mortgage, mortgage interest rates are at least partially deductible in about 2/3 of the EU member states (Johannesson-Linden and Gayer, 2012; Fatica and Prammer, 2018).[8]

2.3 TAXES ON THE TRANSFER OF IMMOVABLE PROPERTY TO A NEW OWNER

The sale of immovable property is generally subject to a capital gains tax, where the difference between the sale and the overall purchase price (often adjusted for CPI inflation after a holding period and/or costs for major improvements of the property) is taxed in almost all EU member states (see Table 1). At the same time, those member states that tax the profits allow for generous exemptions for a main residence. Usually, capital gains on a main residence are tax exempt subject to a minimum time of tenure (2-5 years) or provided that the capital gains are reinvested in the acquisition of a new main residence (e.g. Spain). If immovable property is transferred charge-free in the case of an inheritance or gift, the transfer is subject to inheritance/gift tax in about half of the EU-member states[9]. Even if a state does not apply a general inheritance/gift tax, the cost-free transfer of immovable property might still be subject to taxation. In Austria, for example, a progressive tax – depending on the family relationship and the value of the property – is levied upon the cost-free transfer of immovable property, while there is no general inheritance/gift tax.

Having set the scene, the remainder of the paper is dedicated to reviewing the literature on immovable property taxation either i) according to the type of real estate or ii) according to the type of tax. It presents the economic arguments for the taxation of immovable property and discusses them from considerations of efficiency, equity, fiscal federalism and political economy.

[7] According to Johannesson-Linden and Gayer (2012) FN 6, BE, ES and IT tax imputed rents only for other than main dwellings. LU taxed imputed rents until 2016 based on the cadastral value; the NL use the market value of the property as the tax base. Additional information on the calculation of imputed rent taxation for other EU countries can be found in Figari et al.(2017).

[8] The mortgage financing of business property is usually tax deductible in all member states.

[9] Tax bases for real estate property when bequeathed are very heterogeneous in member states and tax rates vary considerably among groups of heirs and property value.

3 TAXATION OF ONE TYPE OF REAL ESTATE OVER ITS LIVE-CYCLE

Real estate property can be produced for rent in a market by a landlord, for own consumption and investment by an owner-occupier or for a business input. These different purposes of real estate property would call – according to optimal tax theory – for different taxation. According to optimal tax theory, production taxation should not distort factor proportions in production; hence, *"to achieve production efficiency, the tax on business income from housing should be made neutral"* (Englund, 2003:939).

3.1 TAXING OWNER OCCUPIED HOUSING

Owner-occupied housing represents two features to its owners. First, housing usually presents the largest asset of a household, second living in a home provides a flow of services consumed by the owner. If the first view prevails, owner-occupied housing should be taxed as any other asset to achieve neutral taxation, while the second view would call for the taxation of owner-occupied housing like any other durable consumption good.

3.1.1 TAXING OWNER-OCCUPIED HOUSING AS AN ASSET

The household main residence presents on average almost 50% of total assets and more than 60% of total real assets in the euro area (HFCN, 2016). As it also presents the single largest asset in a household portfolio, literature tends to call for taxing it like any other asset under a Haig-Simons income tax scheme (e.g. Poterba and Sinai, 2008). This is to avoid distortions in the allocation of private investment and savings caused by the tax wedge on the return to different forms of capital (Berkovec and Fullerton, 1992; Gervais, 2002). For owner-occupied housing, following the user cost of capital approach, a Haig-Simons neutral income taxation translates into taxing the net return of owning a house, i.e. taxing the imputed rent (fictive rental income) as well as capital gains from selling the property while allowing for the deduction of costs, such as maintenance costs and interest payments in the case of debt-financed purchase. In practice, as stated in section 2, the current treatment of housing taxation leaves imputed rents and capital gains for primary residences mostly untaxed while allowing for mortgage interest deductibility (MID). The effects of this beneficial fiscal treatment of owner-occupied housing have been studied empirically from various angles for the US employing the user cost of capital approach: While the academic literature has reached mixed conclusions on the impact of preferential taxation of owner-occupied housing at the extensive margin – the "own *vs.* rent decision" (e.g. Rosen, 1979; Rosen and Rosen, 1980; Gervais, 2002; Hanson, 2012), it generally agrees that tax preferential treatment incentivises excess consumption of housing-services by home-owners at the intensive margin, i.e. with respect to housing size (e.g. Rosen 1985; Poterba, 1984; 1992, Hanson, 2012). Based on the user cost of capital approach, costs for public finances compared to the neutral benchmark have been found to range from 2.1 to 2.6 percent of overall tax revenues (e.g. Poterba and Sinai, 2008; Martin and Hanson, 2016) in the US. Given the generous MID provisions even for high incomes in the US, various studies stress the

strongly regressive distributional impact of the tax breaks for owner occupied housing (e.g. Poterba, 1992; Poterba and Sinai, 2011; Martin and Hanson, 2016). For the euro area, the few studies[10] employing (variants of) the user cost of capital approach generally confirm the empirical findings for the US. For example, Fatica and Prammer (2018) show that the preferential tax treatment of owner-occupied housing reduces the user cost of housing capital by almost 40 percent compared to the efficient level under neutral taxation. The tax benefits stem mostly from the under-taxation of equity, namely the widespread tax exemption of imputed rents and capital gains. They find that these tax benefits translate into an excess consumption of housing services equivalent to about 30 percent of financial asset holdings in household portfolios. Moreover, given the regressivity of the tax preferential treatment of owner-occupied housing in most euro area states, equity could be increased by the removal of these tax breaks (e.g. Matsaganis and Flevotomou, 2007; Figari et al., 2017; Fatica and Prammer, 2018).

3.1.2 TAXING OWNER-OCCUPIED HOUSING AS A CONSUMPTION GOOD

If (owner-occupied) housing is treated as a (very) durable consumption good, then it should be subject to VAT. Hence it should be subject to (standard) VAT when new, as the price of the good - when new - should correspond to the present value of the stream of future services it provides (Mirrlees et al., 2011). Indeed, new buildings are subject to VAT in most EU member states. However, the upfront acquisition price might be a bad proxy for the stream of services for very long-lived products such as housing. Hence, as indicated by the Mirrlees Review (Mirrlees et al., 2011) an annual tax related to the consumption value of the property is a more effective way of taxing housing. It accounts for changes in the value of housing services and can be applied to the existing housing stock.[11] Practically, recurrent property taxes or imputed rent taxation, adequately reflecting the (consumption) value of the property, would do the job efficiently.

Drawing on optimal tax theory literature, it can be said that on one hand the low price elasticity of housing would call for high taxation while on the other hand its low income elasticity – being a necessary good – suggests lower taxation (compare Englund, 2003; Albouy and Findeisen, 2016). Nevertheless, Albouy and Findeisen (2016) state that it is more efficient to tax housing higher than any other forms of consumption with tax rates being at least 50 percent higher than on other forms of consumption. According to them, two arguments, namely that housing is a substitute for taxable, market-oriented activities and that the value of housing stems from the land it is on – which presents an in inelastic base – both call for high taxation of housing consumption. These factors empirically outweigh the arguments that housing deserves lower taxation because it is a necessity or because it might distort location choices impacting negatively on productivity.

[10] For the EU and euro area, empirical studies employing the user-cost approach are scarce mostly due to data limitations.

[11] This is particularly important when the transition to a VAT for new housing would introduce considerable distortions between new and old housing or lead to lock-in effects if applied to all housing transfers.

3.2 TAXING RENTAL HOUSING

Rental housing presents a pure consumption good for the tenant and an investment good for the landlord. A tax system guaranteeing production efficiency in the provision of housing services should be made neutral (Englund, 2002). Hence, net profits should be taxed as business income, and capital gains tax should be levied when selling the property. Landlords generally include rents received as income and deduct expenses, such as maintenance and operating costs (both labour and capital costs), mortgage interest, and some depreciation costs. The resulting net profit should be subject to corporate income tax or personal income tax depending on the legal status of the landlord. Practical complications might, however, arise due to preferential tax treatment of debt and of double taxation issues of profits and dividends (Englund, 2002). From a consumer's point of view, taxation should not distort tenure decisions between owning and renting a house. While conventional literature points to the tax preferential treatment of owner-occupied housing (compare section 3.1) compared to rental income, Chambers, Garriga and Schlagenhauf (2009) suggest that the progressivity of income taxation can amplify or mitigate these tax asymmetries, with important implications for tenure choices.

3.3 TAXING IMMOVABLE/REAL ESTATE BUSINESS PROPERTY

While it is generally agreed that residential and business real estate property should be taxed differently, the literature on business property taxation does generally not follow the overall life-cycle of the business property. The bulk of the literature is restricted to the effect of recurrent property taxation and assesses it with respect to its implications for business competitiveness (compare section 4.1).

In general, the assessment on how (recurrent) business property taxation should be designed depends on whether one takes the "capital tax view" or the "benefit tax view".[12] The first view considers real estate property as an input factor for the business and calls for taxation in line with other input factors to avoid a misallocation of input factors. As in this view business property taxation falls on capital, thus disincentivizing investment and creating location distortions, the Mirrlees Review (Mirrlees et al., 2011) advocates non taxation of business property on efficiency grounds. Contrastingly, according to the "benefit tax view" the tax falls on land value (and benefits linked to it) making it an efficient means for raising revenues (Smart, 2013). Moreover, Blöchliger (2015) stresses the efficiency of business property taxes as an important backstop to incorporation in order to avoid the residential property tax. Empirically, businesses seem to react little to business property taxes, which supports the "benefit tax view" (Smart, 2013). Norregaard (2013) is among the few to highlight the distortive effects of transfer taxes on businesses, as these taxes impose efficiency costs through resource misallocations to the extent their incidence rests on business inputs.

[12] See Smart (2013) for a review of the literature, including the different arguments put forward depending on the "capital tax view" and "benefit tax view" respectively.

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4 TAXATION OF REAL ESTATE AT A SPECIFIC POINT IN TIME – SPECIFIC IMMOVABLE PROPERTY TAXES

Most of the literature on immovable property taxation focuses on one specific type of tax and assesses its vices and virtues with respect to i) efficiency and effectiveness, ii) fairness/equity, iii) fiscal federalism and iv) political economy. Recurrent property tax on residential property has been in the focus of the literature, while property transfer taxes have gained more attention recently. VAT and inheritance/gift taxation are hardly assessed with a special focus on immovable property and hence are not included in this overview.[13]

4.1 RECURRENT PROPERTY TAXES

The long-standing tradition of property taxes – modern European property taxes date back to the Middle Ages (Almy, 2013) – lies in their transparency, relative ease of administration, their suitability as a stable revenue source for sub-central governments and their economic efficiency. International organisations such as the EU and the OECD keep requesting that taxes be shifted from distortionary labour taxation to property taxation; the grounds alleged are those of efficiency and equity.[14] Indeed, recurrent property taxes are usually found to be among the least detrimental taxes for economic growth (Arnold, 2008), while at the same time they respect equity objectives (Cournède, Goujard and Pina, 2013). This is particularly true for pure land taxes, as land is immobile, and its taxation is on a truly immobile base and hence does not affect decisions to work, save and invest. However, a joint tax on land and the building on it, as applied by most EU member states (Almy, 2013), might impact on investment decisions. Both homeowners and businesses might be discouraged from investing if (improvement) investment results in a higher property tax liability.[15]

However, in most member states property taxes are not levied on recent up-to date market values but on outdated cadastral values (compare section 2; Almy, 2013; Johannesson-Linden and Gayer, 2012; Blöchliger, 2015) and are sometimes area-based. The non-reflection of property values limits the risk of under-investment and moreover stabilizes property tax revenues for member states. Nevertheless, this very feature of the property tax design has been heavily criticised. First, market developments are not reflected and the tax cannot therefore contribute much to dampening the boom-and-bust-cycle of property markets and is thereby limited in

[13] Given the lack of literature and the heterogenous treatment of real estate property when bequeathed, an assessment of its economic (and empirical) impacts is left for further research.

[14] There is also literature assessing the impact of recurrent property taxation on urban sprawl, generally establishing a negative link between recurrent property taxes and urban sprawl (Brueckner and Kim, 2002; Song and Zenou, 2006; Banzhaf and Lavery, 2010). However, housing tax benefits such as mortgage interest deductibility (MID) seem to increase urban sprawl both in the US (Voith, 1999; Glaeser, 2011) and in Europe (for Belgium see: Xhignesse and Verbist, 2019). Nevertheless, MID can increase efficiency in location decisions as it mitigates the tax penalty of working in an area with better-paying jobs and higher house prices (Albouy and Hansen, 2014).

[15] Compare the discussion of "capital tax view" *vs.* "benefit tax view" in section 3.3.

reducing the fluctuations in the economy.[16] Second, the tax is not perceived as fair. Those made relatively wealthier by the market or enjoying more neighbourhood amenities (which should be capitalized into house prices) compared to the time when the cadastral value was set, pay the same property tax as those with stagnant property values. Moreover, the relevant literature (e.g. Wassmer, Fisher and Kuloszewski, 2019) claims that the public does not perceive recurrent property tax as progressive. However, as indicated by empirical literature *"property tax can indeed be anything from progressive to regressive"* (Blöchliger, 2015:15). While this conclusion rests on the exact design of the recurrent property tax applied in practice, it also hinges upon different beliefs about the incidence of property taxation. Theoretically, if property taxes are considered as a real estate tax on capital income ("capital-tax view" or "new view"), it is a progressive tax, as housing capital is generally concentrated among high income individuals. However, if it is seen as a tax on housing consumption services, it is considered regressive as the share of housing consumption expenditure in income is higher for low income households ("old-view"). The third view ("benefit view") considers recurrent property taxes as neither regressive nor progressive, as the tax represents a fee/price for local goods and services.[17] Furthermore, recurrent property taxation does not generally follow the ability-to-pay principle, which is usually considered to constitute a fair tax. A tax on the property value is not linked to current income, which makes it particularly burdensome for income-poor-housing-rich households such as senior households.

Given the practical shortcomings of the recurrent property tax, economists have repeatedly issued reform suggestions, to reap the full theoretical benefits of a recurrent property tax. Among the most frequently expressed reform necessities is the need to update the tax base to market values to increase the fairness of the tax (Norregaard, 2013; Slack and Bird, 2014; Blöchliger, 2015). The issue of equity/distributional reservations could be handled with an increase in the progressivity of the tax design e.g. by exemptions or property tax credits (based on income) for low income households or progressive tax rates. Tax deferrals for retirees would strengthen the ability to pay principle for senior households (Slack and Bird, 2015). A more radical approach has been put forward by work by the OECD[18] suggesting taxing immovable property through the income tax system, *via* the taxation of imputed rents jointly with income from other sources (compare section 4.3).

While reform proposals are manifold, actual recurrent property tax reforms remain limited in number and size. This might be due to two factors: i) fiscal federalism frameworks and ii) political economy considerations. As a recurrent (residential) property tax fulfils the basic requirements for a good local tax (Oates and Schwab,

[16] Poghosyan (2016) has found a limited dampening effect of recurrent property taxes in the US, where recurrent property taxes are levied on property market values. Oliviero et al.(2019) find a strong negative relationship between increases in immovable property tax revenues and house prices for a panel of OECD countries.
[17] For details on different views on the incidence of property taxation see e.g. Fullerton and Metcalf (2002), Smart (2013), Norregaard (2013) and Oates and Fischel (2016).
[18] For a summary on this OECD work see Blöchliger (2015).

2004; Bird, 2011; Bird, Slack and Tassonyi, 2012) such as immobility, predictability, stability, visibility, ease of administration and non-exportability to other jurisdictions (see Table 2), it is usually devolved to sub-central governments. Hence, any changes of the property tax design impact on the sub-central tax mix resulting in the need to change inter-governmental transfer schemes as well or even the whole intergovernmental framework (Blöchliger, 2015; Norregaard, 2013). Another obstacle to property tax reforms seems to be the high transparency of the tax, which has made it "*politically very unpopular*" (Norregaard, 2013:33). Even if a properly designed reform alleviated some of the political economy reservations such as perceived regressivity and unfairness due to outdated market values or issues for liquidity-constrained households, the property tax remains a presumptive tax, based on estimated (market) values. As property tax is capitalized into property prices, any reform would generate winners and losers, where generally losers are more vocal, resulting in "tax revolts" (Blöchliger, 2015). Hence, Slack and Bird (2014) explain the limited appetite for property tax reforms by political considerations outweighing economic principles as stability is favoured over equity and efficiency.

Table 2

Properties of a good local tax

	Recurrent property tax		Property transfer tax
	Residential property	**Non-residential property**	**Residential property**
Immobile tax base	Yes	Yes	Yes
Predictable and stable revenues	Yes	Yes	No
No tax exporting	Yes	No	Yes
Visible and accountable	Yes	No	Yes
Fair based on benefits received	Yes	No	?
Fair based on ability to pay	Yes	?	Yes
Easy to administer	Yes	No	Yes

Source: Bird (2011); Bird, Slack and Tassonyi (2012); own representation for property transfer tax.

4.2 PROPERTY TRANSFER TAXES

Even though property transfer taxes have also a long tradition (Lenoel, Matsu and Naisbitt, 2018) and tax rates can be as high as VAT rates in some countries (see Table 1), they have been heavily criticized on efficiency grounds. Norregaard (2013) and the Mirrlees et al. (2011) point out that transaction taxes discourage transactions and hence might distort the allocation of resources and hence lead to significant welfare losses.[19] Indeed, empirical analysis shows that higher property transfer taxes not only decrease transactions but also lower house prices and house price growth respectively (e.g. Davidoff and Leigh, 2013; Fritzsche and Vandrei,

[19] For a theoretical model see Buettner (2017).

2016; Berger, Turner and Zwick, 2017; Best and Kleven, 2018; Koetter, Marek and Mavropoulos, 2019). Effects seem to be stronger in rural regions than in urban areas (Koetter, Marek and Mavropoulos, 2019). Moreover, property transfer taxes might add imperfections to the labour market *via* the lock-in effect of workers. If transaction costs are high, owners are encouraged to remain in the size and location of their home, irrespective of efficiency gains by moving towards areas of excess labour demand. Several empirical studies (e.g. Van Ommeren and van Leuvensteijn, 2005; Hilber and Lyytikainen, 2017) confirm that higher transfer costs have a negative impact on labour mobility and are even linked to higher unemployment risk (De Graaf and van Leuvensteijn, 2013). Eerola et al. (2019) show that the negative impact of housing transfer taxes on household mobility is even higher when taking spillover effects between different housing market segments into account, which is generally ignored in previous studies.

However, efficiency can also be assessed from a macroprudential point of view, assessing the ability of property transfer taxes to curb house price increases and house price volatility. In addition to curbing house price growth, property transfer taxes also decrease house price volatility (Catte et al., 2004; Kuttner and Shim, 2013) – in particular if they are especially designed to prevent speculation (Hua and Craig, 2011). However, as effects seem to be small or even ambiguous, other macroprudential tools might be more effective in reducing house price swings that might ultimately stress the banking sector and the economy.

According to the fiscal federalism view, property transfer taxes could be perceived as a good local tax. They fulfil the same requirements as recurrent property taxes except that they are a bit less predictable and the revenues are a bit more volatile (compare Table 2). They are levied on an immobile base with high visibility and accountability and usually fairly based on the ability to pay. As property transfer taxes are usually levied on an ad valorem basis on the property transaction price, they are generally quite equitable. Presumably, wealthier and higher income percentiles opt for higher value houses subject to higher taxation, which makes the property transfer tax mildly progressive even in the case of flat tax rates. Clearly, depending on the exact design of the property transfer tax, it can be anything from regressive to strongly progressive. For example, the UK stamp duty is levied at higher rates on higher value houses – where the respective rate is applied to the whole purchase price. However, these kinks in the tax design might provide considerable incentives for undervaluing the property to evade taxes. The incentive for collusion between buyer and seller to evade taxes is another issue in case of high transaction costs (Norregaard, 2013).

While the justification for property transfer taxes could be found in fiscal federalism, equity considerations and macroprudential effectiveness, Mirrlees et al. (2011) and Norregaard (2013) advocate their abolition based on efficiency

grounds.[20] However, as Mirrlees et al. (2011) stresses, outright abolition would lead to windfall gains for existing owners, as property transaction costs have been capitalized into property values.

4.3 CAPITAL GAINS TAXES AND THE TAXATION OF IMPUTED RENTS

4.3.1 CAPITAL GAINS TAXATION

Like property transfer taxes, capital gains taxes on immovable property are levied at the time of the transfer of the property – albeit at the end of its life-cycle with respect to the current owner. Literature[21] seems to conclude that capital gains taxes – like property transfer taxes – can lead to lock-in effects with fewer transactions and less labour mobility as well as distortions in the housing market with respect to tenure and housing size choices. In line with property transfer taxes, capital gains taxes tend to reduce house price volatility and might hence be put to use for macroprudential policy objectives.

As capital gains taxes are levied on a flow, namely income resulting from the appreciation of the housing value, they are usually said to be more efficient taxes than property transfer taxes, which are levied on a stock. According to the Mirrlees et al. (2011) taxes on an income flow are also perceived as fairer than taxes on a stock of wealth. Capital gains taxes also follow the ability to pay principle as those with higher capital gains are subject to higher taxation. However, if the appreciation of the property value is due to general inflation or due to maintenance and improvement efforts, the taxation of overall capital gains might be perceived as unfair and discourage investment into housing (Bourassa and Grigsby, 2000). In practice, however, the advantages and disadvantages for housing markets stemming from capital taxation are not very pronounced, as most member states do not levy taxes on capital gains on primary residences/or owner-occupied housing in general. This favourable tax treatment of housing taxation compared to other (capital) investment might deter investment decisions (compare section 3.1).

4.3.2 IMPUTED RENT TAXATION

As mentioned in 3.1.1 a Haig-Simons neutral tax treatment of owner-occupied housing would call for the taxation of imputed rents, as including them as income better represents the household's consumption opportunities. The failure to do so distorts resource allocation by incentivizing over-investment in housing compared to productive investment and reduces portfolio diversification (Fatica and Prammer, 2018). These capital market distortions are ultimately detrimental to economic growth (Figari et al., 2017). Focusing on the distributional impact of the non-taxation of imputed rents, Figari et al. (2017) show in a microsimulation analysis that including net imputed rents in the tax base of personal income not only equalises consumption opportunities between renters and homeowners but

[20] In the Mirrlees Review (2011) the argument for abolition also seems to be due to the specific design of the UK property transfer tax (stamp duty).

[21] For a literature review on the taxation of capital gains on immovable property see Lenoel, Matsu nad Naisbitt (2018).

also reduces inequality. In their sample of EU countries, higher income families generally hold more expensive properties – translating into higher imputed rents – which are subject to higher marginal tax rates in the progressive personal income tax systems analysed.

This is in line with earlier empirical literature for the EU (Frick and Grabka, 2003; Frick, Goebel and Grabka, 2007; Frick et al., 2010). However, as Saarimaa (2011) and also Figari et al. (2017) point out, the effect seems to be small, and it hinges crucially on how the additional tax revenues are returned to the economy.

Moreover, the concept of imputed rent taxation suffers from severe issues (Bourassa and Grigsby, 2000): imputed rents are not measurable[22] but remain presumptive, which impacts on their perceived fairness and make them administratively very cumbersome. Moreover, they can be perceived as a tax on wealth with detrimental effects on investment decisions.

Nevertheless, several authors (e.g. Gayer and Mourre, 2012; Blöchliger, 2015) consider imputed rent taxation *via* the income tax system a substitute for recurrent property taxation. However, there are several important differences, Firstly, imputed rent taxation *via* the personal income tax system might increase the distortions in the labour market.[23] If taxed at capital tax rates, this might distort households' incentives to shift between labour and capital income (Blöchliger, 2015). Secondly, imputed rent taxation is most likely less transparent than recurrent property taxes as it is levied at source with income. Finally, imputed rent taxation has a stronger link to the ability to pay principle, which might increase its perceived fairness. However, a change from recurrent property taxation – usually accruing to sub-central governments – to imputed rent taxation – income taxation is usually levied by central governments -– is particularly difficult in federalist countries as it changes intergovernmental fiscal relations considerably (Blöchliger, 2015).

5 CONCLUSIONS

The ample literature on immovable property taxation can be grouped into two strands. The first covers the taxation of one type of real estate over its life-cycle, such as owner-occupied housing. It highlights the distortions property taxation introduces into housing investment and consumption decisions compared to other assets/consumption goods. The second strand assesses the merits and demerits of one particular tax on immovable property at a specific point in time, such as recurrent property taxation. The literature assesses the taxes with respect to induced distortions and their effectiveness and efficiency for economic growth, equity and fairness, fiscal federalism considerations and political economy obstacles.

[22] Statistical offices estimate imputed rents on an aggregate level to be included in macroeconomic aggregates such as private consumption expenditure or GDP following ESA conventions.

[23] Tax distortions increase with t^2, as personal income tax is generally progressive, higher income implies higher t.

While grouping the literature along these lines is relatively easy, it is more difficult to summarize the findings. The first strand of the literature agrees that immovable property taxation should be neutral to avoid distortionary behaviour. However, the neutrality benchmark to be chosen depends on the theoretical view taken. Immovable property could be taxed as an investment – for private or business use – or as a consumption good, which determines the benchmark and possible distortions. However, as noted by Lenoel, Matsu and Naisbitt (2018:41), "*most taxes are distortionary, and whether the distortions affecting housing are larger or less desirable than in other markets is still an unresolved issue*."

The second strand assesses one type of tax at a time with respect to its vices and virtues. The focus is usually on efficiency considerations of immovable property taxation while other aspects such as equity, fiscal federalism and political economy considerations, have gained less attention. Given the trade-offs between these aspects, the relevant literature does not seem to allow for a general "best immovable property tax" ranking[24], since the overall effect of a tax ultimately depends on its exact design. Moreover, as indicated in the first strand of the literature, the overall effect of immovable property taxation also needs to be assessed over the object's life-cycle.

However, literature in both strands seems to conclude that property taxation on residential property has a lot of theoretical merits, but that its practical application departs significantly from the theoretical best practice (Slack and Bird, 2014; 2015). Hence, the relevant literature asks for practice to be brought closer to theory. At the same time political economy issues that might act as obstacles to reform should be carefully overcome.

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[24] Cournède, Goujard and Pina (2013) rank different consolidation strategies (increases in particular taxes and cuts in specific spending areas) according to their efficiency and equity trade-offs. A consolidation strategy based on recurrent property tax increases ranks comparatively high; consolidation strategies based on other immovable property taxes have not been assessed.

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The distributional impact of recurrent immovable property taxation in Greece

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Abstract

During the last decade, Greece faced one of the most severe debt crises among developed countries, leading to Economic Adjustment Programs in order to avoid a disorderly default. Public expenditure was cut, tax rates were increased and new taxes were introduced, aiming at restoring public finances. Prominent among the latter were recurrent property taxes that had played a very minor role before the crisis. These taxes helped to boost public revenues but were hugely unpopular. The paper examines in detail their distributional impact and finds that they led to increases in inequality and (relative) poverty. The result is stronger in the case of inequality indices that are relatively more sensitive to changes close to the bottom of the distribution and poverty indices that are sensitive to the distribution of income among the poor.

Keywords: property taxation, inequality, poverty, progressivity, Greece

1 INTRODUCTION

During the 1995-2007 period Greece's average growth rate was 3.9% *per annum;* second only to Ireland among the Eurozone countries and 1.5% above the Eurozone mean. However, Greece's growth model was based primarily on the expansion of consumption and was largely financed by the inflow of external funds. Even though Greek banks were not directly exposed to American subprime bonds, when the economic recession following the Lehman Brothers collapse erupted, the deficiencies of this model became apparent. In 2008 output stagnated and in 2009 the economy moved into full recession. Internal and external imbalances that had been growing steadily in earlier years deteriorated and the economy faced enormous "twin deficits" (in the general government budget and the current account); the deficit in the current account exceeded 15% of GDP in 2008 and the budget deficit was over 15% in 2009. In 2010 Greece was cut off from the international capital markets and in order to avoid a disorderly default had to rely on the help of her Eurozone partners and the IMF, through three Economic Adjustment Programs that lasted for eight years (2010-2018).[1]

In the framework of these programs, Greece agreed to rebalance its public finances through both expenditure cuts and tax increases. As shown in Graph 1, before the Economic Adjustment Programs Greece's share of taxes in GDP fluctuated around 33%, far below the EU average (close to 39%). In the years of the Economic Adjustment Programs Greece's share of taxes in GDP rose rapidly and stabilized above the EU average, close to 41%. During this period, almost all tax rates were increased, while new taxes were introduced. As a result, the share of all types of taxes in GDP (direct taxes, indirect taxes, social insurance contributions and property taxes) rose, as shown in Graph 2. Regarding property taxes, although their share in GDP is small, it rose markedly after the introduction of a new property tax in 2011.

[1] Ioannides and Pissarides (2015), Tsakloglou et al. (2016) and Meghir et al. (2017) provide accounts of the Greek crisis.

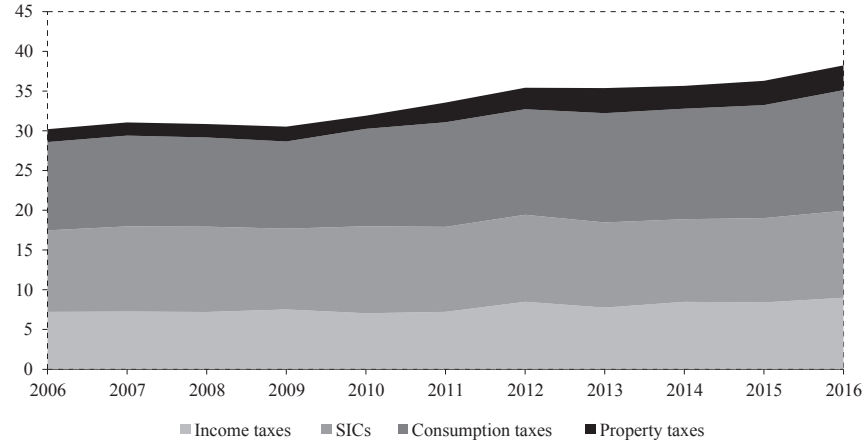
Graph 1

Tax revenues share of GDP, Greece and EU28, 2006-2016

Source: AMECO (2020).

Graph 2

Taxes as shares of GDP, Greece, 2006-2016



Source: Eurostat (2018).

As Mirrlees et al. (2011:368) point out "Most taxes nowadays are levied on flows of income and of expenditure. But land and property have been taxed for centuries – certainly for longer than income – and they continue to form an important part of the tax base in most advanced economies". Property taxation and especially, the taxation of land, has been popular among economists mainly on efficiency grounds. Following Ramsey (1927), Diamond and Mirrlees (1971) show that this type of taxation causes far fewer distortions than other types of taxes, particularly since it affects labour supply decisions minimally and hence, *ceteris paribus,* can be considered a tool to maximize production and welfare. Moreover, due to the

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immovable nature of real estate, property taxation is usually associated with high rates of collectability, making it popular among policy makers (Cabral and Hoxby, 2012).[2]

However, in most cases property taxes are hugely unpopular among the members of the general population (Norregaard, 2013). Mirrlees et al. (2011) conjecture that this unpopularity may be due to the fact that in most countries income and consumption taxes are withheld at source and remitted to the government by firms for the majority of the population. Therefore, property taxes may be the only or the largest taxes that are paid directly by taxpayers and are not withheld at any stage. Further, there is evidence that a considerable proportion of the population think that it is unfair to tax housing property (Lyons, 2007) particularly since, at least in the short run, these taxes are independent of someone's current income and, hence, ability to pay (Slack and Bird, 2014). This unpopularity may be mitigated in cases where property taxes are local taxes and are somehow considered "service charges" to the local community, thus collectively increasing local property values (Musgrave and Musgrave, 1989).

The expected distributional incidence of property taxes depends on the tax base (primary residence only, all housing, industrial buildings, agricultural land, other land types, *etc.*), the tax rates applied both within and across types of real estate as well as the tax relief measures applied. In general, it was expected that since property is a form of capital and capital is more concentrated than income, the redistributive effects of property taxation should be progressive (Aaron, 1974). However, empirical studies in several countries show that usually property taxes constitute a higher fraction of the income of lower rather than higher income deciles[3], thus increasing rather than reducing inequality; see, for example, the results of Kim and Lambert (2009), Davis et al. (2009) and Joumard, Pisu and Bloch (2012) for the United States, Chawla and Wannell (2003) and Palameta and Macredie (2005) for Canada and Joumard, Pisu and Bloch (2012) for the United Kingdom. On the opposite side, Marical (2009) reports that, due to a number of generous income- and family-related tax reliefs, recurrent taxes on immovable property in France are marginally progressive. In the case of Greece, although the contribution of these taxes to the stabilization effort of the economy was significant, their distributional effects have not yet been investigated. The present research aims to fill this gap.

The remainder of the paper is organized as follows. Section 2 provides a description of property taxation in Greece in a comparative perspective *vis-à-vis* other EU countries. Section 3 presents the data and methods used in the empirical analysis. Section 4 contains the empirical results on the distributional effects of recurrent immovable property taxation in Greece. Section 5 provides the conclusions.

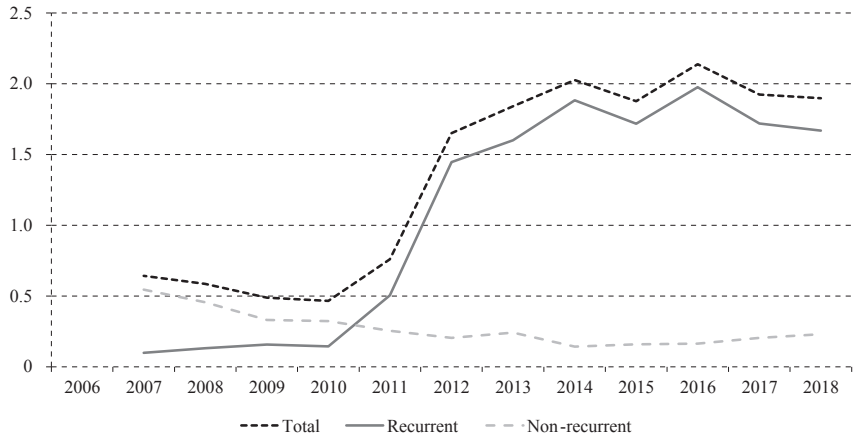
[2] Moreover, property taxes can also be used as policy tools in order to manage urban density, land use and housing market prices as well as speculation and "bubbles" in real estate and, thus, economic cycles.
[3] Throughout the text, the term "decile" denotes "decile group" rather than "decile point".

2 IMMOVABLE PROPERTY TAXATION IN GREECE

Traditionally, immovable property taxation in Greece relied on non-recurrent taxes (taxes on transactions, inheritances and *in-vivo* transfers of immovable property). Usually, such taxes accounted for around 0.4%-0.5% of GDP. Before the 2000s, several attempts to introduce recurrent property taxation were unsuccessful mainly due to lack of property valuations. In the 2000s, with a proper valuation system in place covering most parts of the country, a number of attempts to introduce such taxes under various schemes took place, the most important of which were: the Unified Real Estate Duty (ETAK), the Tax on Large Real Estates (FMAP) and the Municipal Real Estate Duty (TAP). Nevertheless, as shown in Graph 3, the revenues raised from these schemes remained very low (between 0.1% and 0.2% of GDP).

Graph 3

Immovable property taxes in Greece as shares of GDP, 2007-2016



Source: Hellenic Ministry of Finance, General Accounting Office and AMECO (2020).

The picture changed dramatically during the crisis, due to the urgent need to increase revenues. In 2011, the Emergency Special Duty of Buildings Connected to the Electricity Grid (EETHDE) was introduced. The tax was applied only to buildings, both private households and firms being eligible for payments and, in order to achieve a high collection rate, it was collected through electricity bills.[4] In 2014, the Unified Real Estate Property Tax (ENFIA) replaced EETHDE and was extended to the possession of land. On top of this, a supplementary tax was introduced for individuals with a total taxable property value of over 200,000 euros (covering the top 8% of the distribution of natural persons); it was aimed at introducing some progressivity into the scheme. Moreover, reduced rates applied to some of the most vulnerable population groups. Since 2014, changes in the

[4] The tax was introduced in late 2011 and the tax bill could be paid in installments. Most units eligible to the tax paid part of it in 2011 and part in 2012. For this reason, in Graph 3 only part of the effect of the introduction of the tax is recorded in 2011.

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level of tax have taken place mainly in order to introduce further tax deductions for vulnerable groups and gradual deleverage with successive horizontal tax rate deductions in the most recent years.

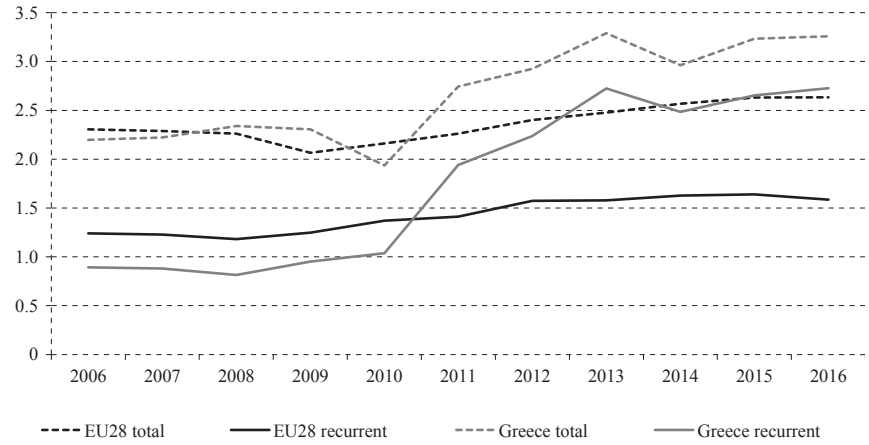
As shown in Graph 3, after the introduction of EETHDE and, especially, ENFIA, the share of recurrent immovable property taxes in national income shot up, reaching 2.0% of GDP. Collection rates were high. For example, according to the General Accounting Office data for 2018, the collection rate of ENFIA was 84%.[5] At the same time, due to the crisis, real estate transactions declined sharply leading to a fall in non-recurrent property tax revenues as a share of GDP and recurrent taxes accounted for the lion's share of property taxes.

The recurrent taxes introduced in the period under consideration were assessed at the individual level and the tax base for the calculation of the tax was the taxable value of each asset. This, in turn, was determined mainly by the (administratively assessed) value of the geographical zone of the real estate asset. A major problem with the assessment of these taxes was that during the crisis property market values declined by over 40% (Bank of Greece, 2019: Table II.6), while their taxable values remained unchanged. The problem was further complicated because Greece lacks a complete cadastral registry and the re-assessment of detailed taxable values would have been a very hard exercise given the low number of transactions in the real estate market during the crisis. This is a usual drawback of real estate taxes in practice in many countries. As Almy (2014) points out, valuation practices frequently ignore revaluation requirements, which almost by definition occur in periods of rapid recession or growth. This lack of revaluation can enhance the perception of taxpayers that property taxes may be unfair. It should be noted that these taxes were introduced close to the peak of the Greek crisis. Output was down by 26%, the rate of unemployment was above 27%, while the disposable income of the average household was 42% below its peak (Andriopoulou et al., 2018). Unsurprisingly, the new tax was hugely unpopular and, according to many commentators, contributed to the downfall of the then government in the 2015 elections.

[5] The corresponding rate for the non-withheld part of personal income taxes was 77% and even lower for indirect taxes.

Graph 4

Total and recurrent property taxes as shares of GDP, Greece and EU28, 2006-2016



Source: Eurostat (2020).

Graphs 4 and 5 compare Greece with other EU countries with respect to revenues collected through property taxation.[6] Graph 4 shows that until 2010 Greece was lagging behind the European average in terms of the share of property taxes in GDP. The gap can be attributed exclusively to the difference in the share of taxes collected through recurrent taxes. After 2010, though, the picture changes completely. Due to the introduction of EETHDE and, then, ENFIA, the share of both recurrent and total property taxes in Greece's GDP exceed the European average by a wide margin; in the last year under consideration in Graph 4, the differences are 1.1% and 0.6% of GDP, respectively.

[6] These graphs refer to property taxation in general; not only immovable property taxation. However, in all countries the latter is the main component of property taxation.

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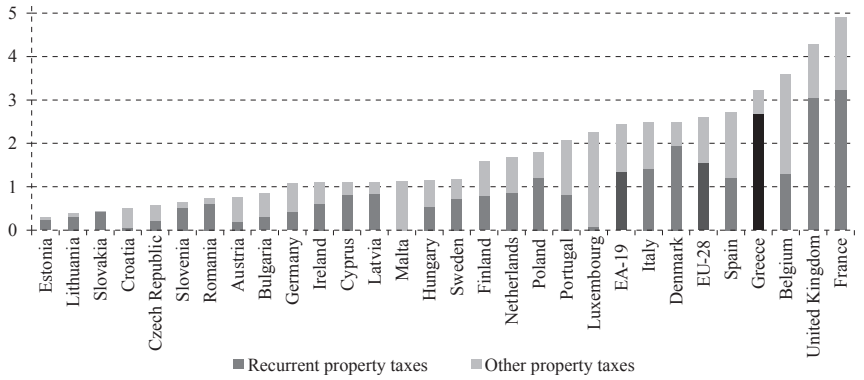
Graph 5

Property taxes as shares of GDP in EU28, 2017

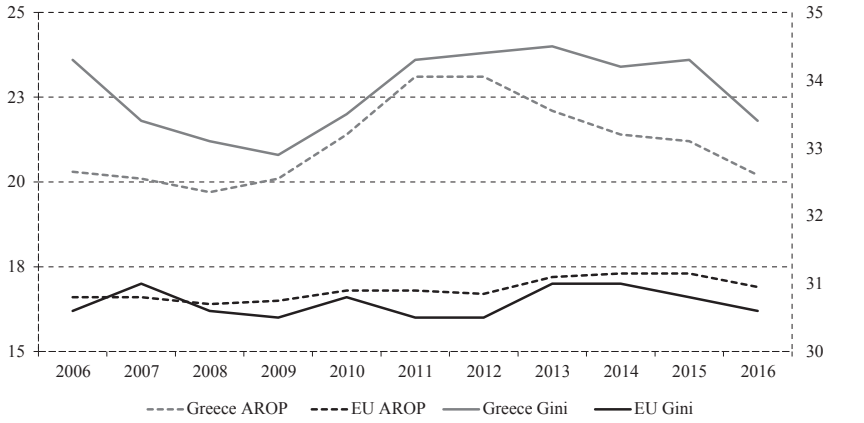


Source: European Commission, Taxation Trends (2019).

Graph 5 shows that in 2017 Greece's share of property taxes in GDP was the fourth highest in the EU (behind France, the UK and Belgium), while in terms of the share of recurrent property taxes in GDP, only two countries were collecting higher revenues than Greece (France and the United Kingdom). Furthermore, Greece's share of property taxes in total taxes collected (8%) is substantially higher than the corresponding mean EU figure (6%) (European Commission, 2019).

Graph 6

Intertemporal changes in Poverty Rate (AROP, lhs) and Gini index (rhs), Greece and EU28, 2006-2016



Source: Eurostat (2020).

Finally, before moving to the empirical results, a few words on changes in inequality and poverty in Greece during the period under consideration are needed. Despite the dramatic changes in living standards of the Greek population during this period, the evidence of Graph 6 that reports intertemporal changes in the Gini

index and the poverty rate when the poverty line is set at 60% of the median equivalized income of the contemporaneous distribution suggest that the changes in inequality and poverty were not that large. Both of the indices remained substantially higher than the EU averages in Greece during this period, rose in the early years of the Economic Adjustment Programs following the sharp increase in unemployment rate and declined in later years. Nevertheless, detailed analysis using inequality indices that are more sensitive than the Gini index to changes close to the tails of the income distribution (especially the bottom end of the distribution) and poverty indices that are sensitive to the depth of poverty as well as the distribution of income among the poor in Andriopoulou, Karakitsios and Tsakloglou (2018) and Andriopoulou, Kanavitsa and Tsakloglou (2020) records stronger changes in inequality - although the pattern is similar to that of Graph 6 - and very considerable rises in poverty using "floating" and, especially, "anchored" poverty lines. Interestingly, unlike what is often heard in the Greek public discourse, the elderly improved their relative position while there was substantial deterioration in the relative position of the enlarged group of the unemployed, who swelled the ranks of the poor.

3 DATA AND METHODS

The data used in the paper are drawn from the Statistics on Income and Living Conditions (SILC) for Greece. We use SILC waves 2007 to 2017, corresponding to income years 2006 to 2016. The data set contains information on property taxes paid. The information appears to be very reliable. For example, in 2017 the sum of recurrent property taxes reported in SILC was 2.3 billion euro, while the total reported by the tax authorities was 2.7 billion euro. However, the latter figure also includes recurrent property taxes paid by firms as well as households.

Due to the complexity of income surveys, such income data only become available with a considerable delay. For instance, the EU-SILC 2020 survey data (reporting incomes earned in 2019) will not be released before 2022. Tax-benefit microsimulation models can fill this gap, providing timely estimates of the effects of changes in taxes and benefits on the income distribution (Figari, Paulus and Sutherland, 2015). In order to assess the distributional impact of changes in property taxation in the most recent years (i.e. 2017, 2018 and 2019) we make use of the Greek component of EUROMOD, the tax-benefit microsimulation model of the EU.

EUROMOD is a tool that enables researchers to estimate in a comparable way the effects of taxes and benefits on the income distribution. The model simulates personal tax and social insurance contribution liabilities as well as cash benefit entitlements for all EU countries based on the national tax-benefit policy rules of a given year and the information available in the underlying microdata. The components of the tax-benefit systems that cannot be simulated are taken directly from the data, along with information on original incomes. EUROMOD has been validated at both micro and macro level and has been extensively used to address a broad range of economic and social policy questions (Sutherland and Figari,

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2013). One of the most important advantages of EUROMOD is attribution; the model allows researchers to isolate the effects of each policy, taking into account the complex ways in which policies interact with each other.

In this paper, EUROMOD's underlying microdata are drawn from SILC 2017. Updating incomes and non-simulated benefits from 2017 to 2019 is carried out using factors based on available administrative or survey statistics. Specific updating factors are derived for each income source, reflecting statutory rules or the change in the average amount per recipient between the income data reference period and the target year. In order to enhance the credibility of our estimates, an effort has been made to address issues such as tax evasion and benefit non-take-up.[7] It should be noted that the estimates of inequality, poverty and progressivity indices reported below with the use of EUROMOD are not strictly comparable with the estimates derived from SILC data. The differences in the simulated results and the results derived from SILC can be attributed primarily to the simulation of several benefits in EUROMOD that are severely under-reported in SILC data (Tammik, 2019). When these corrections are made in EUROMOD, the incomes of a number of poor households rise and the corresponding estimates of inequality and poverty indices are lower than those derived from SILC. Therefore, these estimates are shown primarily in order to identify trends in recent years for which SILC data are not available.

For the period 2017-2019, the applicable property tax is ENFIA. As noted earlier, it consists of two parts: the primary and the supplementary. The primary tax is computed with an elaborate formula that, amongst other parameters, takes account of the cadastral value of the property, its surface, use and age as well as the floor on which it is located. There is also a social provision that grants discounts of 50% or 100% on the tax assessed to taxpayers with low family income, families of 3 or more dependent children, or with members suffering serious disabilities. The supplementary tax is applicable for taxpayers with properties whose cadastral values exceed €200,000. The value of ENFIA is reported in SILC. However, since SILC provides no information on properties' cadastral values, the policy is switched off in the baseline and the tax for 2017-2018 is taken directly from the input data (only minor changes were implemented in these years). However, in 2019 ENFIA was reduced by 10%-30% depending on the cadastral value of the property.[8] This reduction is simulated in EUROMOD. In order to approximate properties' values, we used the average cadastral values for urban and rural/semi-rural areas according to tax data provided by the Greek authorities (i.e. €1,338 per square meter for those residing in urban areas and €745 per square meter for those residing in rural/semi-rural areas).

[7] Detailed information about each of these issues as well as validations against external sources are available in the EUROMOD Country Reports for Greece.

[8] By 30% when the total cadastral value of the properties was below 60,000 euros, by 27% if it was between 60,000 and 70,000, by 25% if it was between 70,000 and 80,000, 20% if it was between 80,000 and 1,000,000 and 10% if it was above 1,000,000 euros.

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For the calculation of inequality, poverty and progressivity indices as well as for the classification of the members of the population in particular decile groups we used the member's equivalized household disposable income. This is the sum of all incomes of all household members net of income taxes and social insurance contributions (and, when needed, property taxes) divided by the household equivalence scale. The latter is used by EUROSTAT, which assigns 1 to the household head, 0.3 to each household member aged below 14 and 0.5 to each of the remaining household members.

4 EMPIRICAL RESULTS

Graph 7

Recurrent property taxes per capita per year, in euro, (lhs) and as share of disposable income, in %, (rhs)

Source: ELSTAT, SILC (2007-2017) and EUROMOD.

Recurrent immovable property taxes *per capita* over time are shown in Graph 7 along with their share in household disposable income. For the first years of the period under examination, the recurrent property taxes in *per capita* terms are close to zero, while the introduction of ETAK in 2009 led to marginal increases. However, the introduction of EETHDE in 2011 increased sharply the amount of tax individuals paid from €15 on average in 2010 to €175 in 2012. Two years later, when EETHDE was replaced by ENFIA, the corresponding figure rose further, reaching a maximum of €225 in 2015. Since then, property taxes *per capita* started to decline due to reductions of cadastral values in many areas across the country and the introduction of tax exceptions for a number of vulnerable population groups. A similar picture emerges for the share of recurrent property taxes in total household disposable income (gross of recurrent property taxes). Starting from close to 0% in 2006, households had to pay a bit less than 4% of their disposable income a few years later, in 2014.

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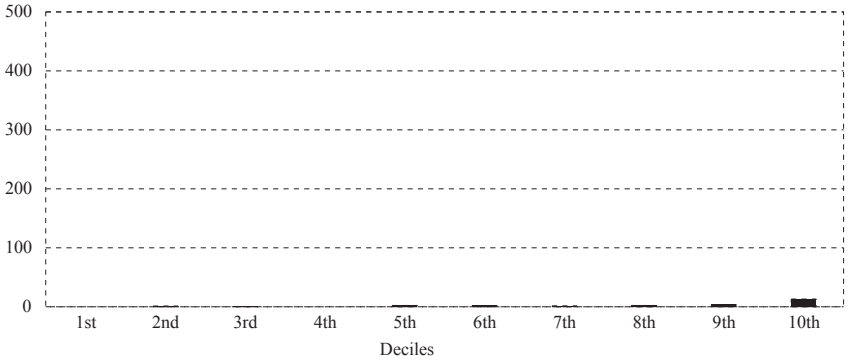
Graph 8i

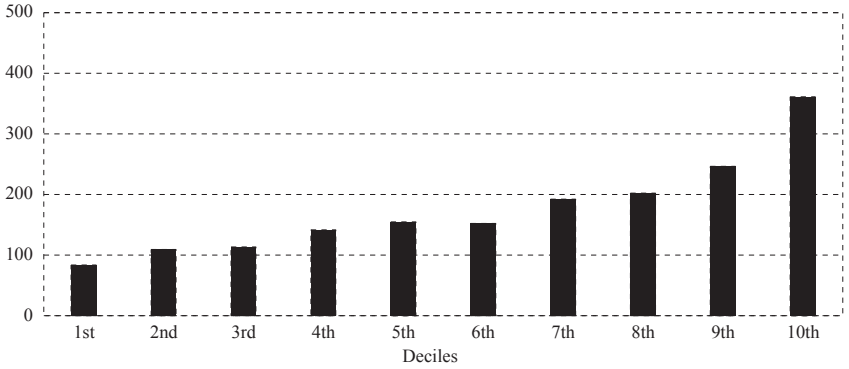
Property taxes per capita by decile, in euro, 2007



Source: ELSTAT, SILC (2008).

Graph 8ii

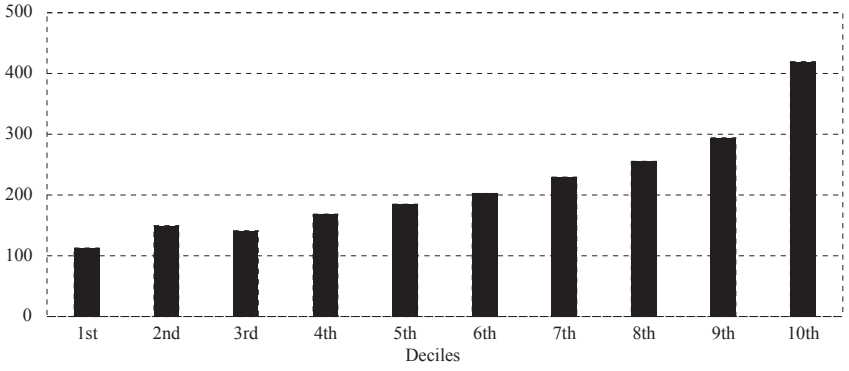
Property taxes per capita by decile, in euro, 2012



Source: ELSTAT, SILC (2013).

Graph 8iii

Property taxes per capita by decile, in euro, 2016



Source: ELSTAT, SILC (2017).

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Graphs 8i, 8ii and 8iii depict the level of recurrent property taxes *per capita* for each decile, when the population members are ranked from the poorest to the richest. For the sake of brevity, we present estimates for three years out of the whole period under examination. These years are 2007, 2012 and 2016 and are representative of the pre-crisis years and the years of the "maturity" of EETHDE and ENFIA, respectively.

For the majority of the population these taxes were zero in 2007. Even for the richest decile, the annual figure *per capita* was below 15 euro. On the contrary, in 2012 and 2016 all deciles paid substantial amounts and the mean payment *per decile* rose continuously when moving from the poorest to the richest decile (with minor exceptions between the fifth and the sixth decile in 2012 and second and the third decile in 2016). Mean *per capita* payments ranged between 84 (113) euro for the bottom decile to 361 (420) euro for the top decile in 2012 (2016).

Prima facie, the evidence of Graphs 8i, 8ii and 8iii could imply that the redistributive effect of the tax is progressive. However, to validate such a statement, we have to look at the tax as a share of distribution of disposable income *per decile* including the property tax (pre-tax distribution). The corresponding evidence is reported in Graphs 9i, 9ii and 9iii. The picture that emerges is anything but progressive, at least for 2012 and 2016. As expected, in 2007 the shares for all deciles are close to zero. In 2012, the share of the tax in the income of the bottom decile is 6.8%, declining almost progressively up to the top decile where it is 2.3%. The corresponding shares for 2016 are even higher; 8.5% and 2.9%, respectively. To some extent, these results may be attributed to the fact that during the crisis a number of property-owning households became jobless, while long-term unemployment soared. Unemployment protection in Greece is quite inadequate, for the long-term unemployed it is almost non-existent, while in the years under consideration there was no benefit of last resort in the form a minimum income guarantee scheme. Hence, many households in the bottom decile had very limited monetary resources while the taxable value of their real estate assets was not so low and, as a result, the decile ratio of taxes to disposable income was high. All in all, the evidence of these graphs provides a very strong indication that the incidence of the recurrent property taxes introduced during the crisis was regressive.[9]

[9] This statement is in line with the vast majority of similar studies treating inequality and progressivity in relative terms. However, there is a strand of literature in which inequality and progressivity remain unchanged if the incomes of all population members change by the same amount (instead of the same proportion), (Blackorby and Donaldson, 1980; 1984). Using this approach, the evidence provided so far would point to the opposite direction, i.e. progressivity, since in absolute terms the property taxes paid by the rich are larger than those paid by the poor.

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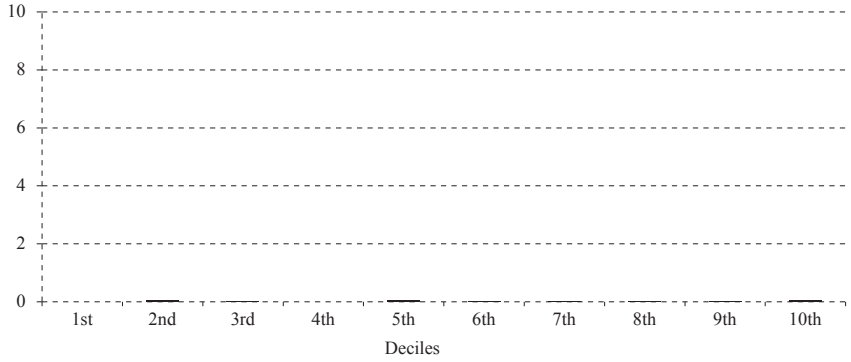
Graph 9i

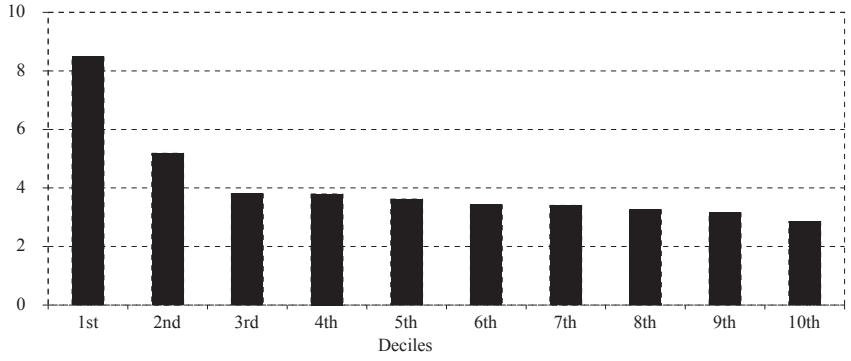
Property taxes as share of disposable income by decile, in %, 2007



Source: ELSTAT, SILC (2008).

Graph 9ii

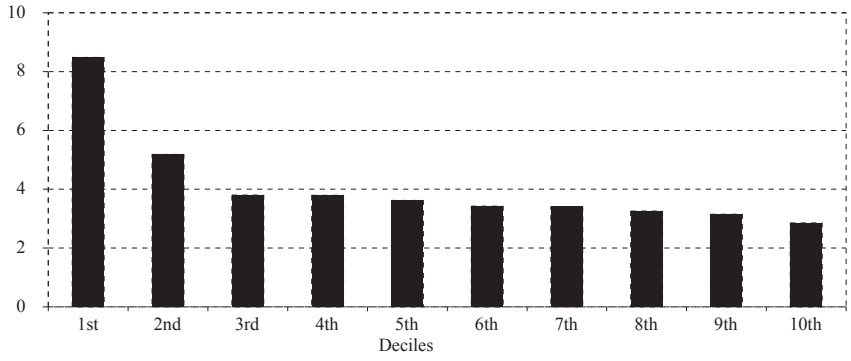
Property taxes as share of disposable income by decile, in %, 2012



Source: ELSTAT, SILC (2013).

Graph 9iii

Property taxes as share of disposable income by decile, in %, 2016



Source: ELSTAT, SILC (2017).

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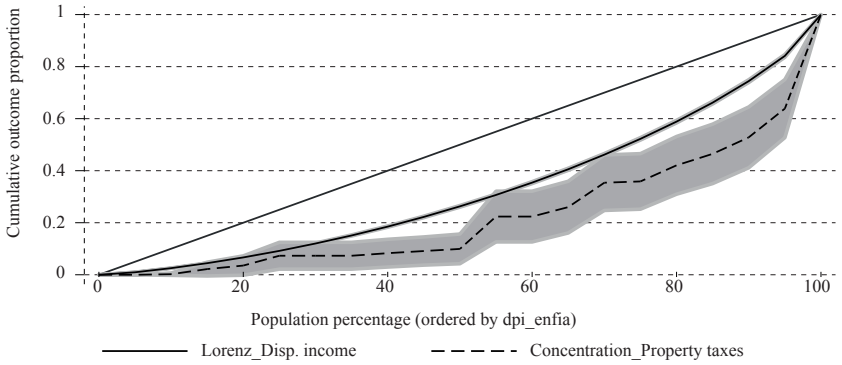
Graph 10i

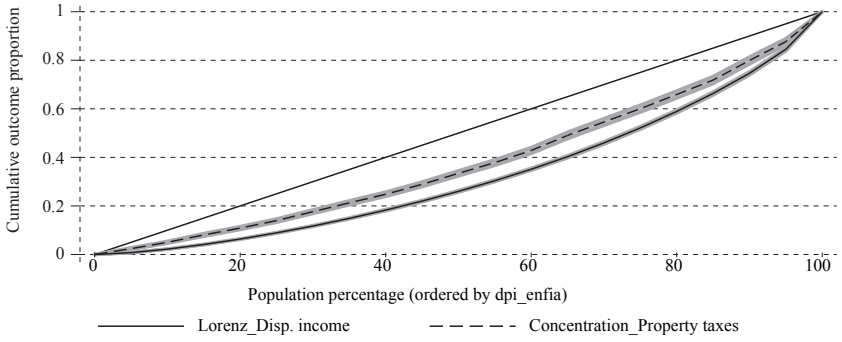
Lorenz and concentration curve, 2007



Source: ELSTAT, SILC (2008).

Graph 10ii

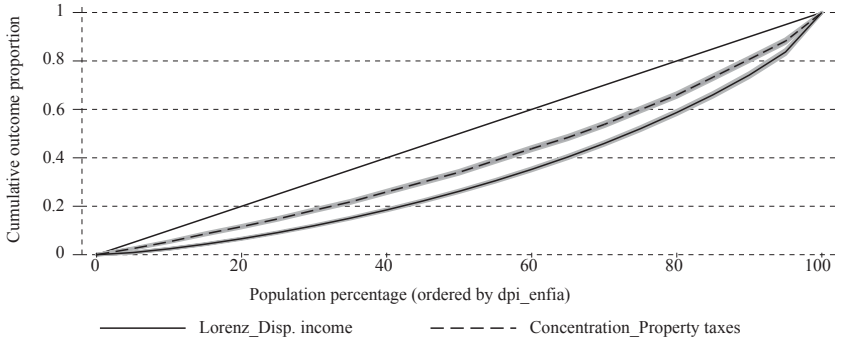
Lorenz and concentration curve, 2012



Source: ELSTAT, SILC (2013).

Graph 10iii

Lorenz and concentration curve, 2016

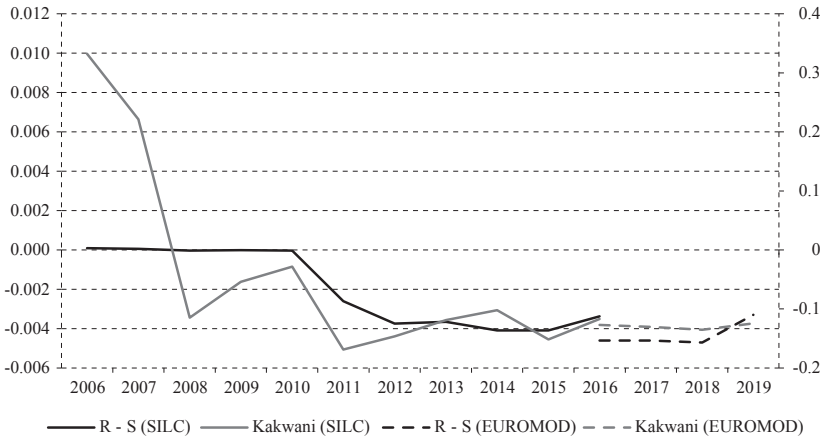


Source: ELSTAT, SILC (2017).

Graphs 10i, 10ii and 10iii go a step further and show the Lorenz curves of the distribution of pre-tax equivalized income and the concentration curves of recurrent property taxes for the three years under consideration. The grey area around the concentration curves is the 5% confidence interval for the corresponding points of the curves. In general, since tax is a negative income component, if the tax concentration curve lies above (below) the Lorenz curve of the pre-tax income distribution, the Lorenz curve of the post-tax income distribution is likely to lie below (above) the pre-tax Lorenz curve. Some interesting observations can be made. In 2007 the concentration curve lies below the Lorenz curve, implying that the property taxes of that year were progressive (the top 5% of the distribution paid almost 40% of the, admittedly very low, total amount of the tax). However, the wide band of the confidence interval implies that safe conclusions are hard to draw. On the contrary, in both 2012 and 2016 the concentration curves lie above the Lorenz curve and the confidence intervals are pretty narrow. This is another indication that the post-tax distribution of income is likely to be more unequal than the pre-tax distribution.

Graph 11

Reynolds-Smolenski (lhs) and Kakwani (rhs) progressivity indices, 2006-2019



Source: ELSTAT, SILC (2007-2017) and EUROMOD.

Graph 11 depicts progressivity indices for all the years under examination. Estimates for the 2006-2016 period are derived directly from SILC data, while EUROMOD-based estimates are provided for the years 2016-2019. Naturally, the simulated estimates of EUROMOD do not coincide with those observed in the sample in 2016, but the differences are pretty low. Estimates of two indices of progressivity (and redistribution) are shown in the graph. The first is the index of Kakwani (1977), which essentially measures departures from proportionality and takes values between -1 and 1; the larger the value of the index is, the more progressive is the social intervention. However, this index is not affected by the size of the corresponding transfer (Enami, Lustig and Aranda, 2017). Estimates of the index are reported on the right vertical axis of the graph. The second index is that

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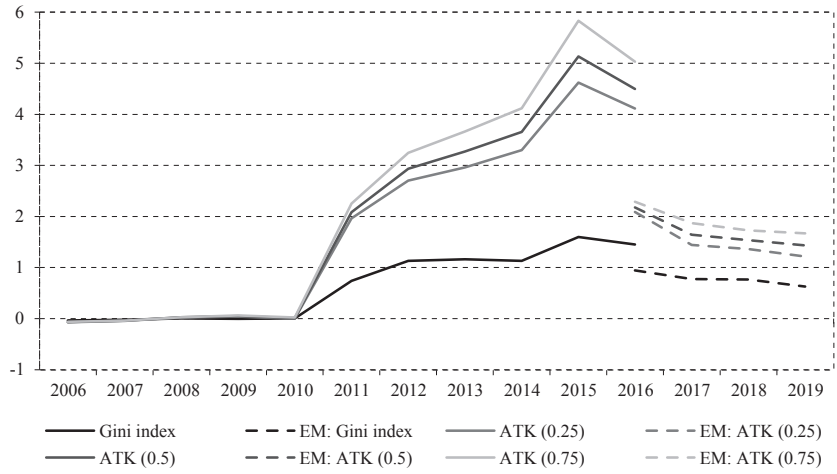
of Reynolds and Smolensky (1977) which, essentially, measures the difference between the Gini coefficient of the pre-tax income distribution and the Gini coefficient of the post-tax income distribution. It also takes values between -1 and 1 and the larger its value, the higher the progressivity of the social intervention. Unlike the former index, this one is sensitive to the size of the transfer. The index of Kakwani has a rather erratic pattern until 2010 but, in general, classifies the redistributive effects of the property taxes in the early years as progressive. On the contrary, the Reynolds-Smolensky index for the same period is always very close to zero, implying that the impact of the tax on measured inequality was negligible. For the period after the introduction of EETHDE and ENFIA, both indices move to negative territory, implying that the property tax reforms of that period were regressive. It is interesting to note that in the final year under consideration, when proportional cuts to ENFIA were introduced, the Kakwani index hardly moves while the Reynolds-Smolensky index records a decline in regressivity (the estimated value of the index increases from -0.047 to -0.033).

Graph 12

Changes in inequality due to property taxation, in %, 2006-2019



Source: ELSTAT, SILC (2007-2017) and EUROMOD.

Inequality indices were calculated both for the distribution of disposable income including property taxes (pre-tax distribution) and for the distribution of disposable income net of property taxes (post-tax distribution). The corresponding proportional changes in the estimates of the inequality indices due to recurrent immovable property taxes for each year are depicted in Graph 12. For the purposes of the graph, we use the Gini index and three members of the parametric family of Atkinson (1970) indices. In comparison to other indices of inequality, the Gini index is relatively more sensitive to changes close to the middle of the income distribution (Cowell, 2000). In the case of the Atkinson index, the inequality-aversion parameter is, successively, set at 0.25, 0.5 and 0.75. *Ceteris paribus,*

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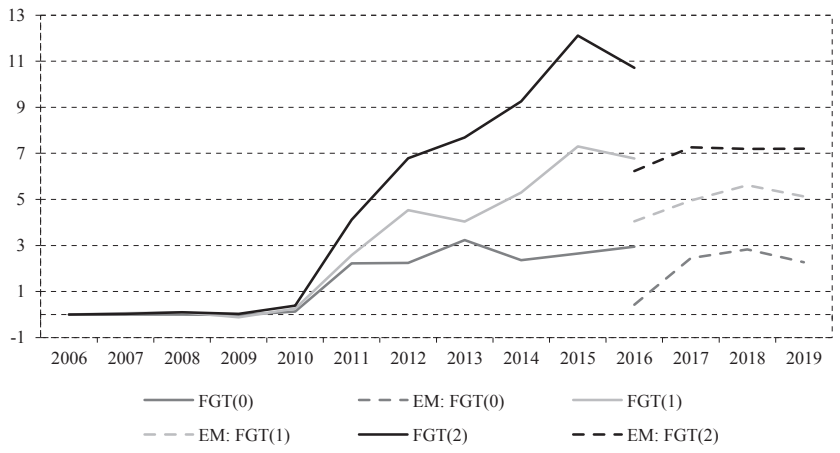
the higher the value of the inequality-aversion parameter, the more sensitive the index is to changes close to the bottom of the distribution. The evidence of Graph 12 shows that the effect of property taxation on the distribution of disposable income for the period 2006-2010 was very close to zero. In the following years the effect is negative and, in fact, the changes in inequality indices become increasingly larger between 2010 and 2015. In 2016 the impact is again inequality-increasing, but the effect is smaller than that of 2015. The change in the value of the Gini index as a result of the immovable property tax reforms (1.6% at the maximum) is smaller than the increase recorded in the Atkinson indices (between 4.6% and 5.8% at the peak). It is worth noting that the higher the inequality-aversion parameter of the Atkinson index the larger the proportional change in the value of the index. The changes in the estimates of inequality indices recorded using EUROMOD for 2016 are smaller than those recorded in the original SILC data, but the relative ranking of the indices remains the same. According to the evidence of Graph 12, for the period 2016-2019, the impact of recurrent property taxation remained regressive, but the changes introduced is these years moderated its inequality-increasing impact.

Graph 13

Changes in relative poverty due to property taxation, in %, 2006-2019



Source: ELSTAT, SILC (2007-2017) and EUROMOD.

Finally, the effects of these taxes on relative poverty are assessed in Graph 13. For the purposes of this graph, the poverty line is not held constant but is always set at 60% of the median income of the corresponding income distribution. Three members of the parametric Foster-Greer-Thorbecke (1984) (FGT) family of poverty indices are exploited for the purposes of this graph: the headcount ratio, FGT(0), which measures the proportion of the population falling below the poverty line, but is not sensitive to the severity of their poverty; FGT(1), which is the product of the headcount ratio and the average poverty gap (distance between the poverty line and the mean income of the poor divided by the poverty line); and FGT(2), which

measures the product of the head count ratio by the squared poverty gap and, thus, unlike FGT(0) and FGT(1) is sensitive to the distribution of income among the poor. The results reported in Graph 13 are largely similar to those of Graph 12. There are minimal changes in the indices until 2010. In most cases we see increasingly larger rises in relative poverty between 2011 and 2015 and a smaller increase between 2015 and 2016 (at least for FGT(2) whose value in 2015 increases by more than 12% as a result of recurrent property taxes - the pattern of the other two is not entirely clear). The higher the poverty-aversion parameter of the index, the larger the recorded proportional change in relative poverty. Changes in the estimates of the poverty indices in 2016 are lower when simulated data are used instead of the original SILC data. However, the simulations of EUROMOD suggest that unlike the changes recorded in inequality indices for the period 2016-2018, the poverty-increasing impact of recurrent property taxes rose during this period. For the last year under examination the poverty-increasing effect of property taxes declines according to FGT(0) and FGT(1) but remains stable according to FGT(2). Nevertheless, it is clear that the reforms in the field of recurrent property taxation in the years of the Economic Adjustment Programs increased relative poverty.

5 CONCLUSIONS

The paper aimed to examine the distributional impact of recurrent property taxation in Greece. Until a few years ago recurrent property taxation played a minimal role in the Greek tax system. In the middle of the recent severe crisis, a new scheme of recurrent property taxation was introduced, initially covering only buildings connected to the electricity grid, but later extended to all types of real estate. The new tax had high collectability, boosted public revenues and substantially helped the fiscal stabilization effort of the country. In line with the experience of several other countries, this tax was also hugely unpopular.

Our results show that the distributional effect of the tax was clearly regressive. Although, on average, in absolute terms richer households paid higher recurrent property taxes than poorer households, the ratio of the tax to the pre-tax disposable income was substantially higher in the case of poorer households. As a consequence, *ceteris paribus,* inequality and (relative) poverty indices rose after the imposition of the tax. The result was stronger in the case of inequality indices that are relatively more sensitive to changes close to the bottom of the distribution and poverty indices that are sensitive to the distribution of income among the poor. Recent policy changes proportionately reducing the tax mitigated these effects. However, carefully designed tax relief may be needed if the aim is to keep the amount of tax revenues collected constant and at the same time neutralize its adverse distributional effects. Yet, taking it into account that the "grey economy" is extensive in Greece (Kelmanson et al., 2019), the link between property taxation and income criteria should be tackled with care in order to avoid increasing incentives for tax evasion.

Disclosure statement

No potential conflict of interest was reported by the authors.

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The indebtedness of households up until the economic adjustment programme for Portugal: an empirical assessment

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Abstract

Ever since the 2008 financial crisis, authorities have been particularly aware of the necessity to be provided with early warning indicators regarding financial stability. Indeed, the Basel Committee on Banking Supervision suggests conducting an analysis of the difference between the private sector credit-to-GDP ratio and its own long-term trend, even though this ratio has been criticised for its poor suitability to countries that have experienced a rapid build-up of credit. For the past two decades, Portugal has witnessed a dramatic increase in the indebtedness of households and the objective of this paper is precisely to examine the relationship between private credit and GDP from 1961 to 2011. Based on the methodology employed in Kelly, McQuinn and Stuart (2011) for the Portuguese case, our main conclusions are the non-suitability of the Basel Committee on Banking Supervision approach for Portugal and the rupture of the link between deposits and credit from 1992 onwards.

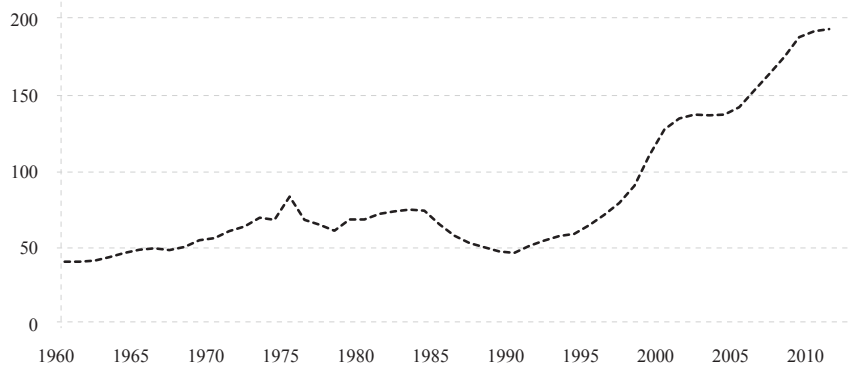
Keywords: indebtedness of households, early warning indicators, credit, Portugal

1 INTRODUCTION

The indebtedness of Portuguese households has not been receiving the amount of attention it deserves. Since the 1990s, the levels of indebtedness have been increasing dramatically, the main reason being that household demand for home purchase has fuelled a rapid growth in credit. The indebtedness of Portuguese households is definitely a topic worth looking closely at due to its peculiar evolution. Portugal is a small and open economy and its households have worrisome levels of indebtedness. According to Castro (2006), the indebtedness of households in Portugal in 1990 was 20 per cent of disposable income, in 1995 it was 40 per cent, and by 2004 it was already 118 per cent. Furthermore, and as illustrated in Figure 1, up until 2011 this trend has shown no signs of slowing down. In fact, this pattern is not exclusive to Portugal, as demonstrated in Kelly, McQuinn and Stuart (2011). In particular, Ireland, the United Kingdom, Spain, and the Netherlands have all indeed experienced the same trajectory of household indebtedness as Portugal. In order to understand the possible reasons for this behaviour it is worth analysing the country's evolution over the past few decades. After the Second World War, Portugal enjoyed the so-called "golden years" of global economic growth that began in 1950. Furthermore, Portugal's integration with several economic organisations – such as the Organization for Economic Co-operation and Development (OECD), the European Free Trade Association (EFTA), the General Agreement on Tariffs and Trade (GATT), and the European Economic Community (ECC), led to a large integration of the country's economy. However, in the 1970s the situation changed: there were two oil shocks (1973 and 1979) followed by the collapse of the Bretton Woods System, and, most importantly, the April 25th Revolution – which ended the 41 years of dictatorial regime in Portugal.

Figure 1

Domestic credit to the private sector in Portugal as % of GDP, 1961-2011



Source: World Bank (2013).

In May 1978, Portugal had no choice but to ask for the International Monetary Fund (IMF) for help to stabilise the troubling macroeconomic environment being felt at the time. With the onset of the second oil crisis in 1979, which was obviously not helpful for the already-fragile situation, the problems Portugal was facing at the time became even worse. After years of struggle, in September 1983 the IMF was called upon for the second time to aid the country overcome its serious macroeconomic imbalances. In 1986 Portugal joined the ECC – now the European Union (EU) – and not only was this an extremely important economic and political milestone, but it was also a crucial point in explaining in part the evolution of the indebtedness of Portuguese households. Portugal embraced the European project and from then onwards started to enjoy the benefits that arise from being tied to the major European economies: economic development, lower inflation, lower interest rates, and higher macroeconomic stability. However, one should take into account that after the April 25th Revolution Portugal was, literally, decades behind some of its European colleagues.

It was also in 1986 that the Portuguese Government started a programme called *Crédito Bonificado*, which was intended to help low-income households by providing interest rate reductions to those who had purchased, or wanted to purchase a house through a mortgage loan. This programme helped many households with modest incomes and also many vulnerable families who were returning from Portugal's former colonies to be able to afford decent and affordable housing. According to the *Direcção Geral do Tesouro e Finanças* (the Portuguese's Directorate-General for the Treasury and Finance), from 1990 to 1998 more housing contracts were signed under the *Crédito Bonificado* programme than under the general regime[1]. From 1999 to 2002, the year that the programme ended, there was a reversal of the situation. Furthermore, in 1999 the DCPS-to-GDP ratio was already

[1] Direcção Geral do Tesouro e Finanças.

at a rather high level and it kept increasing at an astonishing pace up until 2011, as depicted in Figure 1.

In addition, when the Maastricht Treaty was signed, the EU was created and the first steps for the creation of a single European currency - the euro - were taken, along with criteria which countries needed to achieve in order to join the euro. In 1999, the European Currency Unit (ECU) was introduced, and later in 2002 euro notes and coins were officially introduced. Consequently, markets and investors became myopic with regards to each country's risk and interest rates started to decline, as Figure 2 depicts for Portugal.

The Portuguese banking sector took advantage of these years of low interest rates and started to obtain financing in international financial markets in order to keep up with and stimulate the demand of households for their own homes, since domestic resources were inadequate to properly sustain the credit granted. The interest rate decreased as a result of liberalisation and the increase of bank competition, which extended the access to credit to a broader group of households than in previous decades (Farinha, 2008). Portuguese families experienced perspectives for economic growth and even those with a modest income were able to invest in homes. Another consideration regarding the housing sector that must be seriously taken into account concerns the private renting sector. According to the Associação Lisbonense de Proprietários (2011), the first legislative action towards a rent freeze was in November 1920 and later on the eve of the April 25th Revolution in 1974, when some rents in Lisbon and Porto had not been updated since the end of the First World War. Even though some measures had been taken to change the situation, the private renting sector continued to be subject to restrictions and due to a long rent freeze, the housing supply was limited. Landlords simply did not find it attractive to rent their properties, and additionally, rents which had been updated were sometimes higher than the monthly mortgage instalments that households would have to pay if they purchased their own homes.

In a time when interest rates were decreasing and banks were willing to provide generous mortgage loans, many families entered into debt and purchased their own home, with some households even investing in a second home. This was the primary cause of the indebtedness of Portuguese households. In view of the restrictions affecting the private renting sector's supply and the low interest rates, some argue that households were forced to get into debt in order to obtain proper housing at a reasonable price. Portugal became a nation of homeowners. Furthermore, according to the Associação Lisbonense de Proprietários (2011), by 2001, 75% of Portuguese houses were actually occupied by their owner, compared to 57% in 1987. Conversely, the number of tenants decreased from 39% in 1981 to 21% in 2001.

Fast-forwarding to 2010, the economic environment becomes drastically different. With the financial crisis of 2008, the formerly short-sighted investors became extremely aware that the single currency was not going to mitigate each country's

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risk. The interest rate convergence that once existed simply disappeared. As shown in Figure 2, the long-term interest rate had experienced an exponential increase from 2010 with the beginning of the sovereign debt crisis, up until approximately 2011. Being unable to deal with the interest rate increase and the unstable economic environment, Portugal had to ask the IMF for help in May 2011, for the third time, which explains the decline in the interest rate - at least until 2012. That being said, the years 2008 to 2011 were difficult for those Portuguese families which are indebted, and it is unfortunately common to hear about families that could simply can no longer pay their mortgage. It is for this reason that the Portuguese case should not simply be ignored.

Figure 2

Long-term interest rate for convergence purposes for Portugal, 1993-2012

Source: ECB (2018).

Indebted households are more vulnerable to unanticipated shocks - such as unemployment, a decrease in disposable income, or a hike in interest rate - which increases the probability of default and, consequently threatens the country's financial stability. Therefore, the possession of indicators capable of helping authorities flag periods of excessive credit (which usually results in financial instability) became a major concern, particularly since the 2008 financial crisis.

In fact, the Basel Committee on Banking Supervision (BCBS) suggests the use of the Hodrick-Prescott (HP) filter to determine the Private Sector Credit-to-GDP Gap i.e., the difference between the credit-to-GDP ratio and its own long-term trend. It recommends this filter as a common starting point for authorities to determine whether there is excessive credit growth. These so-called "early warning indicators" should be seriously considered, although authorities still have to exercise judgement when making decisions. The BCBS approach has been criticised,

because it has not been considered applicable to countries that had a rapid build-up of credit.

Our article evaluates the relationship between economic growth and credit to the private sector for the Portuguese case, following the methodology applied in Kelly, McQuinn and Stuart (2011). We opt for adopting the same methodology as those authors employed for the Irish case, as Ireland is the same type of small open European and eurozone economy as that of Portugal and it has experienced similar patterns of rapid accumulation of private sector credit. Therefore, and given the similarities of both countries' economies, we decided to adopt the same methodology to analyse the relationship between the domestic credit of private sector and real GDP. Our results point to the non-suitability of the BCBS approach for Portugal and the break of the deposits-credit link from 1992 onwards.

The paper is organised as follows: section 2 reviews the literature, the trajectory of Portuguese household indebtedness as well as the importance of "early warning indicators" and the criticisms of the BCBS approach; section 3 presents our methodology and, lastly, section 4 discusses our results and summarizes the article's conclusions.

2 LITERATURE REVIEW

Financial stability has been at the heart of the authorities' concerns since 2008, when the financial crisis struck the financial system and the most developed economies (see, for instance, Borio, McCauley and McGuire, 2011; Bruno and Shin, 2015). The crisis highlighted the need for stable financial markets and a sound banking sector, as well as the need for a high-quality buffer to aid banks in more unstable times. As Shin (2013:3) states, "finding a set of early warning indicators that can signal the vulnerability to financial turmoil has emerged as a policy goal of paramount importance in the aftermath of the global financial crisis."

To help national authorities know how to intervene when financial distress is a concern, the BCBS drew up procedures to guide national authorities that use the countercyclical capital buffer regime. The BCBS is composed of more than 20 countries and provides a forum that promotes cooperation regarding banking regulation and supervision worldwide, with the objective of improving and enhancing financial stability. The BCBS requires the analysis of the private sector credit-to-GDP gap, as this is considered to be a good indicator of financial stability or an *early warning indicator*. The buffer regime aims to protect the banking sector from the credit cycle, i.e., from periods when credit experiences excessive growth, usually associated with riskier behaviours that can compromise financial stability. There is also the concern to keep the banking sector solvent, stable, and protected against possible future losses, since its weaknesses can rapidly spill over to the real economy. Banks are the link between savers and investors and are vital for companies and Governments, which, on a daily basis, depend on credit to carry out their activities (see, for instance, Drehmann and Juselius, 2014).

To determine whether the sector is strong or not, indicators have to be used. The issue here, however, is that a choice of the variable on which to rely has to be made. Accordingly, the aggregate private sector credit-to-GDP gap was determined as a common starting point. This is the difference between the credit-to-GDP ratio and its own long-term trend, and it requires using the HP-filter. Other indicators are suggested by the BCBS to complement this reference tool, such as real GDP growth, credit condition surveys, funding spreads, and CDS spreads, among other things. It is also important to be aware of the importance of the behaviour of GDP, as this is the denominator of the ratio which is used as a common reference.

However, this BCBS approach is not criticism-proof. Geršl and Seidler (2011) argue that the HP-filter approach is not the most suitable one for Central and Eastern European countries, since the rapid credit growth of these countries could simply indicate a convergence process towards the advanced economies. The authors present an estimation of these countries' equilibrium private credit levels as an alternative indicator for excessive credit growth. Shin (2013) examines the power of three classes of *early warning indicators* in signalling vulnerability to crises. The author concludes that market prices-based indicators are unlikely to succeed and that the most promising ones are those which use banking sector liability aggregates, as these can be used in real time. Regarding the credit-to-GDP ratio gap, doubts exist regarding its ability to be used in real time. Kelly, McQuinn and Stuart (2011) also raise doubts concerning the success of the indicator for those countries which experienced a rapid build-up of credit and focus their analysis on the Irish case. The authors suggest a Markov Switching framework to analyse the periods when the credit-to-GDP ratio was stable to examine the long-term trend during those periods. On the other hand, Giese et al. (2014) were able to show that the BCBS approach works for the UK, and that it provided sound signals of financial crises.

The dichotomy of these results could indicate that the BCBS proposal is not the best one for countries that experienced a rapid build-up of credit – such as Portugal, Ireland, and the Central and Eastern European countries – however it is suitable for more advanced economies, such as that of the UK. In fact, the BCBS points out that this indicator should only be considered as a common reference and starting point for national authorities to make decisions. The committee also advises authorities about the need for reasoning and judgment when carrying out analysis, the indicator should not be used just as a mathematic indicator for decision making.

Despite the criticism, some authors have confirmed the importance of the credit-to-GDP ratio as an early-warning indicator. For instance, Jordà, Schularick and Taylor (2011) show that credit growth is a good indicator for financial instability and that the relation between credit growth and current accounts has been becoming tighter. Drehmann, Borio and Tsatsaronis (2011) show that the deviation of the credit-to-GDP ratio is a good indicator for the build-up phase – the phase when

credit growth is considerable – although it does not send many false signals regarding the imminence of a crisis. Other indicators, such as credit growth and equity price growth, are also considered to be good indicators, even though they are not as good as the former. Regarding the release phase, Drehmann, Borio and Tsatsaronis (2011) show that market-base indicators are those that best signal the beginning of a crisis, even though their performance is by much worse than the performance of the indicators during the build-up phase. Drehmann et al. (2010) show that the difference between credit-to-GDP ratio and its long-term trend seems to be the best indicator for the build-up phase, although authorities cannot rely on this indicator entirely without exercising their judgment regarding each situation. Drehmann (2013) concludes that the gaps of bank and total credit-to-GDP ratios are good *early-warning indicators* and that these can help in the countercyclical capital buffer regime. Furthermore, Aldasoro, Borio and Drehmann (2018) conclude that household debt provides some very useful information as an early warning indicator. In fact, these authors support the opinion that this source of debt, together with international debt data, can supply important insights regarding systemic banking crisis events.

Modern economies rely heavily on credit and it is crucial for a country to be aware of these *early warning indicators*. An indicator which can measure, to some extent, financial instability is a great reference point, but it is nothing more than that. National authorities should not use this indicator or any other indicator merely as a mathematical rule, and should always complement their decisions with judgment and discretion (Drehmann and Tsatsaronis, 2014).

Regarding the indebtedness of Portuguese households, this topic has not been explored very much by scholars and neither have Portuguese politicians paid the amount of attention to this structural problem for the Portuguese economy that it deserves. Therefore, the main contributions regarding this issue have been the statistics produced by the Economic Research Department of Banco de Portugal. Farinha and Noorali (2004) use the data from the 2000s Households' Wealth and Indebtedness Survey in detail to analyse aggregate indicators regarding Portuguese households' wealth and indebtedness. The authors show how house purchase credit is the main reason for the household debt. They posit that although household wealth has increased over the past two decades, the indebtedness of households has grown even more. The authors do not think that the more vulnerable households (indebted young families) represent any risk to financial stability, even though they acknowledge that these highly-indebted households would be extremely affected if they had to face unemployment, income reduction, or an interest rate increase. In addition, Castro (2006) elaborates a model for cases in which consumers face liquidity constraints in order to study the sensitivity of Portuguese household consumption to disposable income. His model shows a reduction in liquidity constraints in the 1990 decade due to the decrease in interest rates and the increase of financial liberalisation. Consumption increases at the end of the same decade and the beginning of the 2000s with a respective increase of

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the indebtedness of households as a percentage of disposable income. Furthermore, Farinha (2008) uses the data from the 2006/2007s Households' Wealth and Indebtedness Survey to analyse the indebtedness of Portuguese households. Once again, the author concludes that the most vulnerable households are the young and low-income families, although their share of the debt market is relatively low when compared with the total and they pose little or no risk to financial stability.

Farinha and Costa (2012) carry out a microeconomic analysis of the results from the 2010s Household Finance and Consumption Survey, which concludes that the upward trend of the indebtedness of households throughout the last two decades has been interrupted as a consequence of the Economic Adjustment Programme that Portugal has been subject to since 2011. From the survey's results, the authors also conclude that the percentage of households which are unable to meet their financial obligations is low, but is likely to increase due to the country's difficult macroeconomic environment (such as unemployment and a decrease in disposable income). The same authors argue that the most vulnerable households are indebted low-income and young households. Even though young families' participation in the debt market is high, the amounts borrowed are not significant when compared to the total and their debts are underwritten by real estate. Therefore, the authors consider that in case of default, the impact on financial stability would be mitigated. Lastly, Costa (2012) also uses the 2010s Household Finance and Consumption Survey to determine the probability of default by taking into account the households' economic and socio-demographic features. Similar to Costa and Farinha (2012), Costa (2012) concluded that low-income households are those with a higher probability of default. His study shows that households that have defaulted did so due to unexpected shocks to their financial situation, such as unemployment, and such default would not have happened if it were not for these unanticipated shocks. The author goes on to explain that this situation shows how households were rational when taking credit decisions i.e., if no shocks had occurred, then the indebted families would have continued to be able to meet their financial commitments.

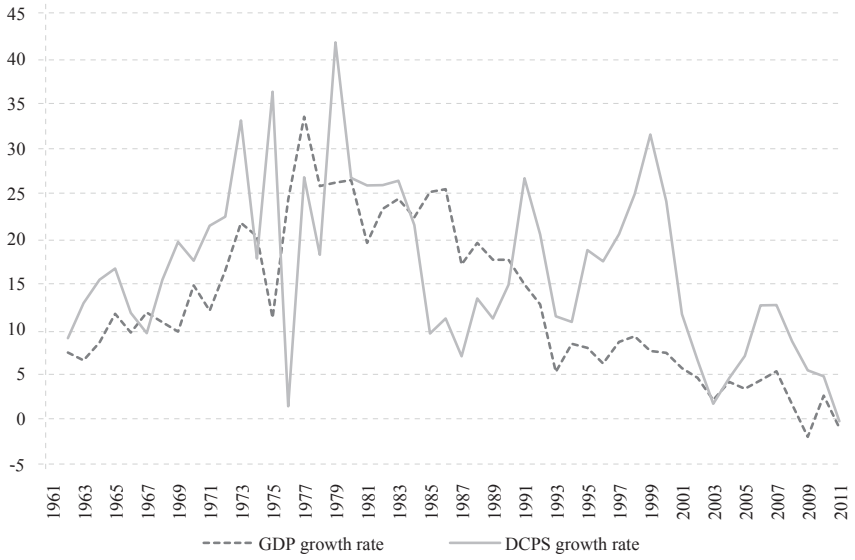
3 EMPIRICAL ANALYSIS

As reflected earlier, and given the similarities between the historical dynamics of indebtedness among households in Ireland and Portugal, despite the afore-mentioned features regarding economic structure, our empirical analysis follows that employed in Kelly, McQuinn and Stuart (2011). By observing the evolution of real Portuguese GDP and the ratio of Domestic Credit-to-Private Sector (DCPS) over GDP growth rates, we are able to state that neither rate exhibits a greatly correlated behaviour. Nevertheless, from 1961 to around 1973, the rates seem to be correlated (meaning there is growth in both GDP and DCPS). From 1973 to around 1989, the growth rates display a different behaviour. Due to the April 25th Revolution, the two IMF programmes that Portugal went through, and also the country's entrance to the EEC, DCPS growth is lower than GDP growth in certain years. However, from 1990 onwards, the growth rate of DCPS is substantially

higher than GDP growth (except for 2003 and 2011), due to the decrease of interest rates that started during the 1990s and led to an increase in credit, particularly to meet the demand of households to own their own home (these dynamics can be seen in Figure 3).

Figure 3

Annual Portuguese GDP and DCPS growth rates, 1961–2011



Source: World Bank (2013).

3.1 METHODOLOGY AND DATA

Regarding the methodology employed in this paper, we first resort to a two-state Markov Switching model to perform a structural break analysis of the DCPS-to-GDP ratio. This is a widely used model and one of its advantages is that it enables the observation of multiple states in a relationship. The model takes the following form,

$$\left(\frac{DCPS}{GDP}\right)_t = \begin{cases} \alpha_1 & s(t)=1 \\ \alpha_2 & s(t)=2 \end{cases} \quad (1)$$

where *s(t)* is the state the economy is in at time t. A Markov chain determines *s(t)* which depends on a transition matrix and can be interpreted as one being a stable state, and another being an unstable state.

After making the structural break analysis, we employ the Granger Causality Test in order to obtain information regarding the ability of each variable to predict the other. This test covers the entire period and the computed sub-periods which resulted from the structural break analysis. Next long-run regressions are carried out to understand the relationship between DCPS and GDP - not only throughout the entire period, but also during the sub-periods detected. In the interest of

robustness, two long-run estimators were used: OLS (Ordinary Least Squares) and DOLS (Dynamic Ordinary Least Squares).

The first method estimates parameters by minimising the sum of squared residuals and it takes the following forms, depending on which variable is the independent one,

$$GDP_t = \beta_0 + \beta_1 DCPS_t + \varepsilon_t \tag{2}$$

$$DCPS_t = \beta_0 + \beta_1 GDP_t + \varepsilon_t \tag{3}$$

where β_0 is the constant term, β_1 measures the effect of the independent variable on the dependent variable, and ε is the error term.

The second method is the one conceived by Stock and Watson (1993). The purpose of DOLS is to determine the long-run relationship between the variables. This method not only adds lags and leads of the differenced regressors to address autocorrelation problems, but it also allows for potential endogeneity between the variables. This method is also used in models regarding credit and households. Hansen and Sulla (2013) use DOLS to determine the long-run relationship between variables in a model that aims to clarify whether credit growth in Latin-America is excessive and is leading to overheating in the economy leading to a housing boom, or not. Rubaszek and Serwa (2014) use DOLS in the interest of robustness to estimate the long-run relationship between the model's explanatory variables to study the credit behaviour of households over time. Depending on the dependent variable, the DOLS regressions take the following form,

$$GDP = \beta_0 + \beta_1 DCPS + \sum_{j=-k}^{k} \theta_{1,j} \Delta DCPS_{1,j} + \varepsilon \tag{4}$$

$$DCPS = \beta_0 + \beta_1 GDP + \sum_{j=-k}^{k} \theta_{1,j} \Delta GDP_{1,j} + \varepsilon \tag{5}$$

where β_0 is the constant term, β_1 measures the effect of the independent variable on the dependent variable, ε is the error term, and $\theta_{1,j}$ measures the effect of the independent variable in first differences on the dependent variable. $\Delta DCPS$ and ΔGDP are, respectively, the growth rate of DCPS and GDP. It is assumed that ε follows an AR(2) process and that the number of leads of lags, k, is equal to 2. Lastly, all data is retrieved from the World Bank's World Development Indicators database, covering the period from 1961 to 2011, totalizing each variable (GDP and DCPS) 51 observations[2].

[2] The series employed in this study for DCPS and GDP variables are the Domestic credit to private sector (% of GDP) – Indicator code: FS.AST.PRVT.GD.ZS – and GDP (constant LCU) – Indicator code: NY.GDP.MKTP.KN -, respectively.

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3.2 MARKOV SWITCHING MODEL

Before carrying out the analysis of the reasons that could have triggered the switches, there is a need to explain both states presented in the model. State 1 is considered to be the unstable state, since it occurs during the years when the DCPS-to-GDP ratio has quick oscillations and an erratic behaviour. State 2 is considered to be the stable state and it mainly occurs during the 1961-1975 and 1992-2011 sub-periods, when the ratio has a stable behaviour in the sense that it grows continuously throughout.

The first switch observed is in around 1975, which could correspond to the April 25th Revolution. According to Lopes (1983), there was an extreme increase in the annual average of the 6-month credit interest rate, which was 7.5% in 1974 and 9.3% in 1975, which may have motivated the first switch. The second switch occurs in 1978, with the advent of the first IMF programme. At this time, the annual average of the 6-month credit interest rate was 10% in 1976, 13.3% in 1977, and by 1978 it was already 18.8% (Lopes, 1983). The third switch occurred around 1985, which probably corresponds to the end of the second IMF programme, which began in 1983, which, like the first IMF programme, also established quantitative limits to credit. The fourth and last switch is in around 1992, which corresponds to the Maastricht Treaty signature which ultimately led to the associated decline in interest rates and consequently an increase in indebtedness. When analysing the DCPS-to-GDP ratio, which is depicted in Figure 1, it is clear that the ratio increases drastically from 1992 to 2011, from approximately 53.3% in 1992 to 192.1% in 2011. The results of both the Constant Markov Transition Probabilities Matrix and the two-state Markov Switching model are presented in Table 1 and in Figure 4, respectively.

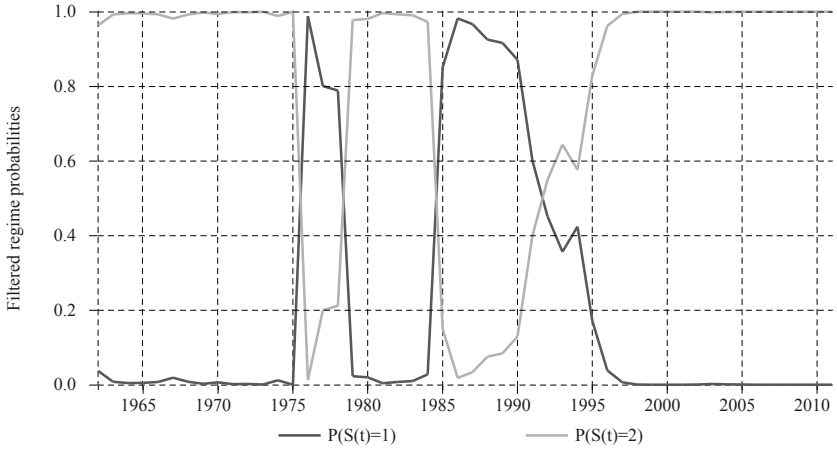
Table 1

Constant Markov transition probabilities matrix (all periods)

	1	2
1	0.769918	0.230082
2	0.049433	0.950567

Source: Authors' calculations.

Figure 4
State probabilities of the DCPS-to-GDP ratio for Portugal, 1961-2011



Source: Authors' calculations.

3.3 LONG-RUN ESTIMATES

From the Markov Switching results two important structural breaks stand out in around 1975 and 1992. For these two periods, 1961-1975 and 1992-2011, the long-run relationship between the variables was analysed in detail.

First, we performed the Granger Causality Tests, which showed that GDP seems to be helpful in predicting DCPS and *vice versa* for the entire period studied, and also for the 1992-2011 sub-period. However, in the 1961-1975 sub-period GDP can be seen to be Granger-caused by DCPS, although the opposite does not occur. The results are shown in Table 2.

Table 2
Granger causality tests

	1961-2011	1961-1975	1992-2011
GDP does not granger cause DCPS	0.001 (9.178)	0.010 (8.764)	0.022 (5.193)
DCPS does not granger cause GDP	0.000 (9.871)	0.279 (1.504)	0.008 (7.144)

Source: Authors' calculations. Tests conducted with 2 lags. The F-statistics are in parenthesis.

When considering the entire period, both the OLS and DOLS estimates show that GDP explains DCPS, and *vice versa* (see Table 3). However, when analysing the two sub-periods closely, the results are different. In the first sub-period (1961-1975), both variables are non-stationary and co-integrated, which means that they have to be analysed in a Vector error correction (VEC) model, which is provided by the following form,

$$\Delta GDP_t = \beta_{GDP,0} + \beta_{GDP,GDP,1}\Delta GDP_{t-1} + \beta_{GDP,DCPS,2}\Delta DCPS_{t-1} + \lambda_{GDP}\left(GDP_{t-1} - \alpha_0 - \alpha_1 DCPS_{t-1}\right) + \nu_t^{GDP} \quad (6)$$

$$\Delta DCPS_t = \beta_{DCPS,0} + \beta_{DCPS,GDP,1}\Delta GDP_{t-1} + \beta_{DCPS,DCPS,2}\Delta DCPS_{t-1} + \lambda_{DCPS}\left(GDP_{t-1} - \alpha_0 - \alpha 1 DCPS_{t-1}\right) + \nu_t^{DCPS} \quad (7)$$

where ΔGDP and $\Delta DCPS$ are GDP and DCPS in first difference, respectively, λ_{GDP} and λ_{DCPS} are the error-correction coefficients, v_t^{GDP}, and v_t^{DCPS} are the error terms. The expressions in parenthesis are the co-integrating vector between the variables. Please note that the results for OLS and DOLS are presented in Table 3, while the VEC and VEC-Error correction estimations are presented in the following Tables 4 and 5, respectively.

The results from Equation (6) show the existence of short-run causality originating from DCPS to GDP, but the results from Equation (7) do not show the existence of short-run causality originating from GDP to DCPS. This may be explained by the fact that throughout this period, DCPS growth demonstrated erratic behaviour that did not match the growth of GDP. It is clear that DCPS grew significantly, particularly in 1969, 1973, and 1975, whereas GDP did not. In fact, for instance, in 1975, DCPS grew by 36%, whereas GDP only grew by 1%.

Another detail in Equation (7) is that λ_{DCPS} is negative and statistically significant, which means that there is a long-run causality from GDP to DCPS, i.e., GDP causes DCPS in the long-run. In short, GDP causes DCPS in the long-run, but not in the short-run (see Table 4 and 5). The sub-period between 1992 and 2011 also reveals interesting results. Even though the OLS method shows that GDP and DCPS explain each other, the DOLS approach does not show that GDP explains DCPS. Since DOLS is considered to be a more robust and improved method, this final result should be taken into account, because it may be capturing some effects that OLS is not.

It is important to notice that the Granger causality test results seem to contradict the OLS and DOLS results. In the first sub-period, GDP does not Granger-cause DCPS and the VEC model actually does not show short-run causality originating from GDP to DCPS. This may be somewhat explained by the backwardness of the Portuguese economy. In fact, those who had access to credit during the period before the democratic revolution were only a small proportion of the population - the owners of capital. Furthermore, and given the fragile market structure of the Portuguese economy (which was characterised by a lower degree in market competition) and the flow of goods from the metropolis to the colonies, credit requirements tended to grow at a lower rate than the Portuguese economy itself. However, during the second sub-period when GDP and DCPS seem to be helpful in predicting each other, DOLS shows that GDP does not explain DCPS. As mentioned previously, the aim of using the Granger causality test was only to give to provide an idea of the ability of variables to predict each other. Despite this possible contradiction, it is important to consider the limitations of econometric

analysis, as it is impossible to capture all the effects of all of the variables. A completely correct and flawless analysis is simply impossible to achieve.

Table 3

Long-run estimates of Portuguese GDP and DCPS

	OLS	DOLS		OLS	DOLS
			1961-2011		
DCPS	0.000 (4.279)	0.000 (12.096)	GDP	0.000 (4.279)	0.000 (4.338)
			1992-2011		
DCPS	0.008 (3.178)	0.013 (-2.973)	GDP	0.008 (3.178)	0.640 (-0.481)

Note: 46 observations for the 1961-2011 and 20 observations for the 1992-2011 period.

Source: Authors' calculations. T-statistics are in parenthesis.

Table 4

Vector error correction (VEC) model estimations, 1961-1975

	GDP	DCPS
DCPS	0.015 (2.995)	
GDP		0.582 (-0.570)

Note: 13 observations.

Source: Authors' calculations. T-statistics are in parenthesis.

Table 5

VEC Model: Error-correction coefficients, 1961-1975

	GDP	DCPS
λ_{GDP}	-0.159 (-0.880)	
λ_{DCPS}		-72.566 (-4.826)

Note: 13 observations.

Source: Authors' calculations. T-statistics are in parenthesis.

4 DISCUSSION AND CONCLUSIONS

Two main conclusions immediately become apparent from an analysis of the results. The first is that, for the case of Portugal, just as for the case of Ireland, the BCBS approach does not appear to be the most suitable one to adopt. Portugal clearly has two outstandingly different periods (1961-1975 and 1992-2011) which must be taken into account separately. Even though the results considering the entire period seem well-behaved, they disguise the astonishing evolution that this ratio has been experiencing.

As explained previously, the BCBS approach apparently only works for economies which did not experience a rapid build-up of credit, and our results seem to corroborate this hypothesis. The DCPS-to-GDP ratio can be an indicator of financial instability, yet the approach to analyse this ratio needs to be taken into account carefully in order to produce the best results. As Portugal is a small and open economy, which experienced a sharp growth in credit to households, the country should definitely pay attention to the DCPS-to-GDP ratio as a way of tracking the evolution of indebtedness of households and Portugal's own financial stability.

The second conclusion is that the DOLS results for the second sub-period showing that GDP does not explain DCPS could well suggest a break of the link between deposits and credit. Traditionally, banks grant credit to investors and households according to the level of deposits made by savers and it is this link that has always kept the banking system sound and stable. However, Figure 3 shows the existence of some sub-periods where the growth rate of DCPS was significantly higher than the growth rate of GDP. Assuming that savings are related to a country's economic performance, and also taking into account the fact that Portugal's GDP did not grew significantly over the past two decades, it appears that credit growth was not accompanied by a growth in savings. Indeed, Banco de Portugal (2004) stated that "the strong growth in credit granted by the banking system since the mid-1990s has not been matched by similar developments in resources from customers. In fact, deposits with the Portuguese banking system recorded relatively moderate growth rates over the past few years".

From approximately the 1990s, the traditional banking conduct was not manifested in the Portuguese banking sector. Due to the lack of domestic resources and a strong growth in credit fuelled by household demand for housing, banks were obliged to resort to alternative forms to finance credit, such as the international financial markets. Banks realised that there was no longer an obligation to grant only credit based on the level of deposits, since they had access to an almost limitless pool of funds at a low interest rate which enabled them to do business differently. For Banco de Portugal (2004) warns - "recourse to market financing is relatively more important for the larger Portuguese domestic groups than for most banks in other European countries". Moreover, Banco de Portugal (2005) states that the increasing share of Portuguese banks' borrowing from international financial markets potentially increases their vulnerability to changes in the sentiment of these markets".

From approximately the time of the April 25th Revolution up until 1977, the credit-to-deposits ratio increased considerably, attaining a level of 121%. Considering the social and political situation at the time, this increase is to be expected, since Portugal received thousands of Portuguese returning from the former colonies after the end of the regime, and this phenomenon was one of the causes of the first IMF intervention in the country. As mentioned earlier, due to the IMF interventions in 1978 and 1983 which established quantitative limits for credit, the

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credit-to-deposits ratio decreased from 1977 onwards and throughout the 1980 decade, reaching 64% in 1989 – which represents the minimum value recorded in the study's sample. From the 1990s onwards, the ratio increased dramatically, attaining its maximum of 170% in 2007. The financial crisis led to a considerable decline in the credit-to-deposits ratio from 2007 to 2010, not only because the crisis caused financial instability, but also, more importantly, because it brought about risk awareness, which made credit standards stricter. Investors were no longer afflicted by myopia and interest rates increased tremendously, as illustrated in Figure 2.

It is also worth mentioning how the current account balance accompanies the evolution presented in Figures 5 and 6. For from around 1996 to 2008, the current account balance decreased significantly, attaining a level of -12.6% of GDP in 2008, which means that throughout this period the Portuguese economy was being financed by external savings, i.e., Portugal was living beyond its means. Consequently, the increase in credit without a proper basis contributed to the degradation of the current account balance – which is one of the causes of the current European crisis that is negatively affecting the Portuguese economy.

In conclusion, our paper analyses the reasons for the indebtedness of Portuguese households, which is a topic that has probably not being receiving the attention that it justly deserves, considering its implications for the economy. Since the 2008 financial crisis, there has been a growing concern for the authorities to be provided with the so-called "early warning indicators", in order to be able to take prudent actions when facing financial distress. The BCBS suggests using the HP-Filter to determine the Private Sector credit-to-GDP gap i.e., the difference between the credit-to-GDP ratio and its own long-term trend and also recommends this ratio as a common starting point for the authorities to determine whether there is an excessive credit growth, or not. This approach is not criticism-proof, and some authors have shown that it is not the most appropriate one to apply for countries which have experienced a rapid build-up of credit. Kelly, McQuinn and Stuart (2011) reached the same conclusion for the case of Ireland, has a small and open economy, similar to that of Portugal.

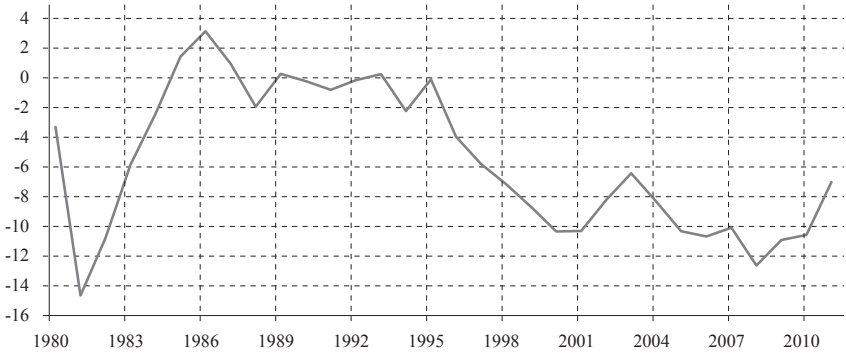
Using the World Development Indicators data for the DCPS-to-GDP ratio from 1961 to 2011, a two-state Markov Switching model was constructed to explore the structural breaks that the ratio could demonstrate and also the periods where long-run estimates could be made. Two major structural breaks were identified and they show two important sub-periods: 1961 to 1975, and 1992 to 2011. The long-run relationship between DCPS and GDP was analysed for these sub-periods, as well as for the entire period, using OLS and DOLS methods.

There are two main conclusions. The first is that the BCBS approach is not the most suitable one to be applied for the case of Portugal, as it disguises the existence of two distinctly different periods, particularly the second period. The second

main conclusion is that GDP does not explain DCPS from 1992 to 2011, which probably indicates that the link between deposits and credit was broken during this sub-period. Banks started to obtain financing from international financial markets in order to meet the particularly strong demand of households for housing, which, in fact, was partly encouraged by banks providing attractive mortgages - even for households with a more modest income. This irresponsible conduct by the banking sector was not stopped or prevented by Banco de Portugal, which assumed a passive attitude towards the development of this situation, even though it was perfectly aware of it. The dramatic evolution of Portugal's DCPS-to-GDP ratio was a loud "early warning indicator", which was not seriously taken into account by the authorities. This ratio reflected the risky behaviour of Portuguese banks during the 1990s and the beginning of the 2000s, and it fuelled a tremendous build-up of credit which ultimately damaged the country's financial stability.

Figure 5

Current account balance as % of GDP, 1980-2011



Source: IMF (2013).

The behaviour of the banks throughout the 1990s and the beginning of the 2000s has been seriously and heavily criticised for being irresponsible, since it led to a dramatic growth in credit, based on loose standards. The alternative forms of financing credit other than deposits were justified by the huge demand for house-ownership by households. The banks cannot disclaim responsibility for the situation, as they encouraged this demand with attractive mortgages, even for households with modest incomes.

When discussing the banks' responsibility for the levels of indebtedness of households, it is important to point out that during those years of loose credit, the banks' conduct was neither stopped, nor questioned. In its role as the regulator, Banco de Portugal did not find the situation worrisome, and took no actions to prevent the exponential increase of the bank credit-to-banks deposit ratio.

Throughout the 1990s and the beginning of the 2000s, the regulator's attitude towards the situation was passive and no preventive actions were taken. Nevertheless, Banco de Portugal acknowledged the high levels of indebtedness of households during this period and also the fact that banks made much use of the international financial markets to support credit. One would have expected that in around 2000, Banco de Portugal would have noticed the already significant increase in the credit-to-deposit ratio and that it would have tried to control, or diminish the situation. But on the contrary, it maintained a passive attitude by assuming that there was no problem regarding financial stability, because household debt was based on real assets – houses - and since the institution assumed the inexistence of a housing bubble, these houses would always be an asset which the banks could rely on in case of default. Banco de Portugal (2008) actually states that "financial stability should not be in jeopardy" considering that "credit to individuals being dominated by credit for owner-occupier mortgages helps to explain it". Banco de Portugal also defends itself by saying that there was "no evidence of situations of excessive valuation of property assets in the country".

Banco de Portugal also assumed that there was no considerable risk to financial stability, since the most indebted households were those with low incomes and even though their participation in the debt market was high, their level of borrowing was not significant when compared to the total, as explained above. Banco de Portugal (2008) even stated that "although the near future does not bode well, with an increase in unemployment impacting on the ability of some individuals to honour the debts, there seems to be little likelihood of the situation affecting financial stability in any substantial way." Considering that this was the regulator's stance, the banks basically had free rein to continue with their risky behaviour: there was no demand for them to explain their behaviour and they received no signals from the regulator to control the situation.

Finally, it is important not to forget that other players contributed to this dramatic situation in Portugal. Banks granted credit without a proper basis, however households also got into significantly high levels of debt in comparison to their income. Perhaps most importantly, the regulator adopted a passive attitude towards the situation throughout the most critical years.

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Merit goods and excise taxation in quasilinear markets for complementary private consumption

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Abstract

This paper models merit goods such as education and health, in a Lindahl-Foley environment in which public goods may be treated as private ones since merit goods are public goods that could have been provided privately. It does so in terms of a Levitan-Shubik quasilinear quadratic utility from complementary commodities and uniform taxation of non-merit commodities to finance the provision of merit goods. This analytical framework serves best the purpose of characterizing the general equilibrium. Complementarity is found to serve as an engine for increased output after the introduction of taxation, with a higher volume of private goods, lower tax rate, and minimal price for the merit goods at the new equilibrium.

Keywords: merit goods, complementarity, quasilinear quadratic utility, excise taxation

1 INTRODUCTION

Although there is a debate concerning the content of the term "merit goods" (Desmarais-Tremblay, 2017; 2019), the standard practice is to relate such goods to healthcare, education, and social protection spending, which are rival in private consumption and affect welfare through distribution policies; public goods like defense, are mostly non-rival in nature (Fiorito and Kollintzas, 2004). The first-best strategy in providing merit goods is to those who need them after their identification, and this identification may be too costly to be administered. The second-best strategy involves the taxation of non-merit goods that can substitute for the merit good, like TV *vs*. education, and subsidization of non-merit goods that can complement the merit good, like grocery and food for the poor (Schroyen, 2005; Wenzel and Wiegard, 2006). In any case, merit goods are those goods and services that low-income households will under-consume if acquired on the basis of ability to pay, but which ought to be provided to these people by the public authorities. This "ought" is taken to be in violation of consumer sovereignty and hence, constitutes (soft) paternalism that does not fit the standard welfare economics framework (Cserne and Desmarais-Tremblay, 2018). However, there do exist attempts to model merit goods in the context of taxation (Schroyen, 2005; Levaggi and Menoncin, 2008).

The empirical evidence is that merit goods are complements to private consumption, which is not the case for public goods and hence the positive effects of merit goods on the economy exceed those of public goods (Fiorito and Kollintzas, 2004; Kotera and Sakai, 2017). This evidence confers real-world relevance on the theoretical argument that there is scope for complementarity between private and public goods (Kaufman, 1998); it just sorts out which exactly are the public that are complementary to private goods. But, from this point of view, the provision of merit goods can be considered neither paternalistic nor incompatible with willingness to pay, falling outside the realm of Pareto efficiency. People treat merit goods as complementary to their overall consumption when maximizing utility. Given in general the positive externality of merit goods, the state might address this

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problem by financing the production of them from the proceeds of a tax on private consumption.

Assuming away considerations of saving, private consumption coincides with income before the introduction of merit goods. It could be represented by one consumer good in pre-tax utility, which utility nevertheless contains an argument applying to a would-be merit good too. Responsible for the satisfaction of the demand for the would-be commodity is government production, which is available to the consumer once demand for it is expressed. The production is made possible on the basis of taxation. The debate here is whether the tax should involve (i) a combination of income taxation and commodity taxation below the level of only a Pigovian tax or (ii) only "corrective" Pigovian taxation. It is a question motivated by environmental concerns but generalized to include any public good, posed because each choice results in the provision of different levels of public good (Chang, 2000).

Of course, the meaning of "corrective" under complementarity in a two-good framework, is tax income able to subsidize the production of the good with the positive externality. This is the only way to finance the production of a merit good but only if this good does not already exist in the economy; the income tax is also a tax on the consumption commodity. If merit goods already exist, the income tax is also a tax on these goods to subsidize their production (Schroyen, 2005). Consequently, in this case, only commodity taxation on the private good may be used to finance merit-good provision. The general conclusion is that indirect taxation on non-merit goods is the means through which governments can in practice, regardless of the issue of pre-existence, supply merit goods. This is a conclusion applying to more than one private good, in which case only some substitutes for the merit good might be taxed, as the second-best strategy above prescribes. In any case, as soon as there is no dilemma about commodity tax alone or in combination with income tax, only one will be the level of merit-good provision.

Now, considering a merit good and a non-merit complementary consumption commodity, divided perhaps into a complementary and another complementary too, or substitute good, one in essence considers the whole economy. Comparative statics, then, such as those surrounding the "double dividend" controversy in environmental economics, have in our case a flavor of macro-dynamics too. This is especially so when the origin of the discussion is the pre-merit goods pre-tax status quo towards a new equilibrium that includes such goods, as follows: If the value of the volume of merit goods produced by the state is the one that consumers would prefer, the tax adjusts accordingly, and consumers absorb the value of the merit goods they wanted. Under conditions of private-public good complementarity, they will also want to increase the consumption of private goods to at least its pre-tax level, which is not possible under the after-tax income. The associated excess demand will induce a price increase that will in turn encourage the supply of more private goods.

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By Walras's law, the value but not quantity of merit goods will decrease, which beyond ethics, is the economic reason why such goods should be offered at a minimal price: the private goods price increase will be smaller after the imposition of taxation, and their production larger. At the after-tax equilibrium, the volume of merit goods will be the one desired by the consumer, with increased volume of private-consumption goods and subsequently, a lower tax rate: Supply creates its own demand, after all. Much more so, under a sales or specific tax, which firms pass on to the consumer only partially. Such in a general viewpoint does not presume a framework of Lindahl-Pareto equilibrium workings, but does hypothesize a Lindahl-Foley environment in which public goods may be treated as private ones. The structure of public goods is the linear one presupposed by Lindahl so that preferences about such goods can be subject to the dictum that "more is preferable to less".

This is what is assumed by the next section too, but within the context of a quasi-linear quadratic utility, implying that there does exist ultimately some point of satiation at which the utility from complementarity is exhausted. Three goods are assumed; one is the merit good, another one is a private good, which is strongly complementary to the merit good, and the third one represents other private consumption, whose complementarity may be weaker. The intensity of complementarity is a way of motivating the distinction among the three goods, since one only complementarity index can be used by the utility function under consideration. The merit good may be public education, with school supplies being the strongly complementary one; this is a case relevant in terms of expenses to younger households. Or, the merit good may be public health promotion, with the strongly complementary product being the unavoidable services from the private health system, a case which is more relevant to older households[1]. Accordingly, the assumption made about the presence of the bliss point in utility is reasonable. There is a point beyond which further education and purchase of school supplies or benefit from public and private health services, becomes meaningless; utility remains unchanged. In any case, judging from human development reports (Groot and van den Brink, 2006), the complementarity of the merit good with private consumption may be strong, too.

The quantity supplied of this good is assumed to be the one coming out of the utility maximization problem *à la* Foley (1970; Florenzano and del Mercato, 2006) approach. It is produced by one public firm, financed either through an *ad valorem* tax or *via* a specific tax on the two private-sector commodities. The consumption of merit goods made possible by taxing complementary products will encourage the consumption of the taxed products as well. The tax rates are found to depend only on the supply of the merit good and the size of the public firm relative to the size of each of the two private firms. Calibrations suggest that *ad valorem* taxation is more

[1] There are many reasons why public education should be provided: the classical efficiency argument, but also from a distributive point of view this could be defended. Then the question is: how is the merit good argument for public education built further?

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flexible and less antagonizing of the private sector firms relative to revenue neutral specific taxation under consumer sovereignty, but the latter type of excise taxation is more precise in terms of optimality, fostering production efficiency as well. Given additionally the efficiency under which the public firm is supposed to operate, specific taxation is compatible with overall Pareto efficiency by comparison to *ad valorem* taxation. Section 3 concludes this paper by comparing the approach adopted here and its results with similar work. The main novelty in approach is, of course, the choice to analyze the subject in a Lindahl-Foley-type of framework under quasilinear quadratic utility. The main novelty in terms of results is that in so far as the financing of merit goods is concerned, only an institutional preference for private sector might justify the choice of a sales tax as a financing means.

2 FORMAL CONSIDERATIONS

Consider two complementary groups of products, q_i, $i = 1,2$, being sold each at an average price of p_i.There is also a non-profit public firm, providing at price p_s another good, q_s, which is complementary to q_i and q_j, $j = 1,2, j \neq i$. It does so by collecting either an *ad valorem* tax or a specific tax imposed on the firms of the private goods at rates t and τ, respectively. That is, if π_s denotes profit for the public firm,

$$\pi_s = p_s q_s - c_s q_s = p_s q_s - t\left(p_1 q_1 + p_2 q_2\right) = 0 \Rightarrow$$

$$t\left(p_1 q_1 + p_2 q_2\right) = p_s q_s \tag{1}$$

where c_s is the average and marginal production cost of q_s. Similarly,

$$\tau\left(q_1 + q_2\right) = p_s q_s \tag{2}$$

That is, indirect taxation is supposed to be revenue neutral, and the public-firm budget is balanced in line with Pareto efficiency requirements, given truthful revelation if preferences; presumably, $p_s = c_s$.

The quantity of the public good produced is the one which is desired by the consumer, who is assumed to behave in line with Levitan and Shubik's (Shubik and Levitan, 1980; Choné and Linnemer, 2019) non-symmetric quasilinear quadratic utility model (QQUM)[1], maximizing,

$$\begin{aligned} & U\left(q_1, q_2, q_s\right) - \sum_{i=1}^{2} p_i q_i - p_s q_s \\ & = \sum_{i=1}^{2} \left(a_i - p_i\right) q_i + \left(a_s - p_s\right) q_s - \frac{\sigma}{\beta}\left(q_1 q_2 + q_1 q_s + q_2 q_s\right) \\ & - \frac{1}{2\beta}\left\{\sum_{i=1}^{2} \frac{\left[1 - \sigma\left(1 - \omega_i\right)\right]}{\omega_i} q_i^2 + \frac{\left[1 - \sigma\left(1 - \omega_s\right)\right]}{\omega_s} q_s^2\right\} \end{aligned} \tag{3}$$

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where $\sigma\in(-\infty,0)$ captures the extent of complementarity between q_i and q_j, and between q_i and q_s, on the average, because the complementarity between the two private goods may differ from that between these goods and the merit one. Parameter $\omega\in(0,1)$ is a weight reflecting the size of each firm, $\omega_1+\omega_2+\omega_s=1$. Consumers take the ω's for granted. But, from the comparative statics viewpoint, the variations of ω_s reflect variations of the size of this firm that do not necessarily reflect public-firm output variations in the same direction. A similar argument is applicable to private firms, with the observation that an increase, say, of ω_s, implies a decrease of the sum $(\omega_1+\omega_2)$, but not necessarily of private firms' output given that all products are complementary.

Coefficient $a>0$ measures quality; it is a (marginal) quality (or utility) index, one for each variety i, and s): Other things equal, an increase in increases the marginal utility of consuming the good to which it refers. $\beta > 0$ shows how quickly the marginal utility of each good declines; it is a concavity parameter: Letting the left-hand side of (3) be noted by Γ, $\partial^2\Gamma/\partial q^2=\left[1-\sigma\left(1-\omega\right)\right]/\beta\omega$. It is a very important parameter, because zeroing the total differential of this derivative for a given σ, one obtains: $d\omega/d\beta = -\omega\ [1-\sigma\ (1-\omega)\ ]/\beta\ (1-\sigma) < 0$, which indicates that an increase of the slope of the marginal utility curve decreases the size of the firm to which the differential refers. The steepness of the marginal utility presumably shapes the extent of complementarity as sellers provide the kinds of goods consumers prefer: Zeroing again the total differential, and setting $d\omega = 0$, yields: $d\sigma/d\beta=-\left[1-\sigma\left(1-\omega\right)\right]/\beta\left(1-\omega\right)<0$; the higher the slope of the marginal utility curve, the weaker the complementarity is. These, of course, are trends expected to be qualified considerably by the introduction of taxation.

The indirect demand functions obtained from (3) are:

$$p_i=\frac{\beta\omega_i a_i-\sigma\omega_i\left(q_j+q_s\right)-\left[1-\sigma\left(1-\omega_s\right)\right]q_i}{\beta\omega_i} \tag{4}$$

and

$$p_s=\frac{\beta\omega_s a_s-\sigma\omega_s\left(q_1+q_2\right)-\left[1-\sigma\left(1-\omega_s\right)\right]q_s}{\beta\omega_s}=c_s \tag{5}$$

If the public sector respects supposed consumer sovereignty regardless of the market structure considerations surrounding the supply of private goods, the case with the specific tax will be in view of (5) and given (2):

$$p_s q_s=\frac{\beta\omega_s a_s q_s-\sigma\omega_s\left(q_1+q_2\right)q_s-\left[1-\sigma\left(1-\omega_s\right)\right]q_s^2}{\beta\omega_s} \tag{6}$$

or inserting from (2), $(q_1+q_2)=p_s q_s/\tau$ in the right-hand side of (6),

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$$p_s q_s = \frac{\tau\beta\omega_s a_s q_s - \sigma\omega_s p_s q_s^2 - \tau\left[1-\sigma\left(1-\omega_s\right)\right]q_s^2}{\tau\beta\omega_s} \tag{7}$$

from which, solving for τ, yields:

$$\tau = \frac{\sigma\omega_s q_s}{\left[\beta\omega_s a_s q_s - \beta\omega_s - \left[1-\sigma\left(1-\omega_s\right)\right]q_s^2\right]} \tag{8}$$

Also, obtaining the sum $(p_1q_1 + p_2q_2)$ from (4) by multiplication with the corresponding q_i, and solving for t, yields:

$$t = \frac{\beta^2\omega_1\omega_2\omega_s a_s q_s - \sigma\beta\omega_1\omega_2\omega_s\left(q_1+q_2\right)q_s - \beta\omega_1\omega_2\left[1-\sigma\left(1-\omega_s\right)\right]q_s^2}{\left\{\beta^2\omega_1\omega_2\omega_s\left(a_1q_1 - a_2q_2\right) - \sigma\beta\omega_1\omega_2\omega_s\left[\left(q_2+q_s\right)q_1 + \left(q_1+q_s\right)q_2\right] - \beta\omega_s\left[1-\sigma\left(1-\omega_s\right)\right]\left(\omega_1+\omega_2\right)\right\}}$$

Although τ is independent of private sector circumstances, this does not appear to be true for t, because it depends on the production volume of the private goods. Nevertheless, there does exist a simple relationship between the two tax rates, which is obtained by noting that (7) becomes in view of (1):

$$t\left(p_1q_1 + p_2q_2\right) = \frac{\tau\beta\omega_s a_s q_s - \sigma\omega_s t\left(p_1q_1 + p_2q_2\right)q_i - \tau\left[1-\sigma\left(1-\omega_s\right)\right]q_s^2}{\tau\beta\omega_s} \Rightarrow$$

$$t = \frac{\tau\left\{\beta\omega_s a_s q_s - \left[1-\sigma\left(1-\omega_s\right)\right]q_s^2\right\}}{\omega_s\left(p_1q_1 + p_2q_2\right)\left(\tau\beta + \sigma q_s\right)} \tag{9}$$

(9) is as independent of private sector considerations as (8) is. Moreover, it is susceptible to calibration under the same assumptions surrounding (8) for various τ's and values of the sum: $(p_1q_1+p_2q_2)$, which is not the case with the more complex expression regarding t above. The calibrations, of course, are a means of illustrating the overall picture resulting from the interaction of the partial derivatives of comparative statics; an interaction whose outcome might be difficult to appreciate intuitively on the basis only of algebra.

The calibration assumptions about (8), derive from the complementarity between the public and private goods, rendering the numerator of (8) negative. Since the fraction has to be positive, the denominator has to be negative, or:

$$\left[1-\sigma\left(1-\omega_s\right)\right]q_s^2 - \beta\omega_s a_s q_s + \beta\omega_s > 0 \Rightarrow$$

$$q_s = \frac{\beta\omega_s a_s \pm \sqrt{\left(\beta\omega_s a_s\right)^2 - 4\beta\omega_s\left[1-\sigma\left(1-\omega_s\right)\right]}}{2\left[1-\sigma\left(1-\omega_s\right)\right]} > 0 \tag{10}$$

The discriminant, Δ, will be positive *iff*:

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$$\Delta = (\beta\omega_s a_s)^2 - 4\beta\omega_s\left[1-\sigma(1-\omega_s)\right] > 0 \Rightarrow \beta\omega_s a_s^2 > 4\left[1-\sigma(1-\omega_s)\right] \Rightarrow$$

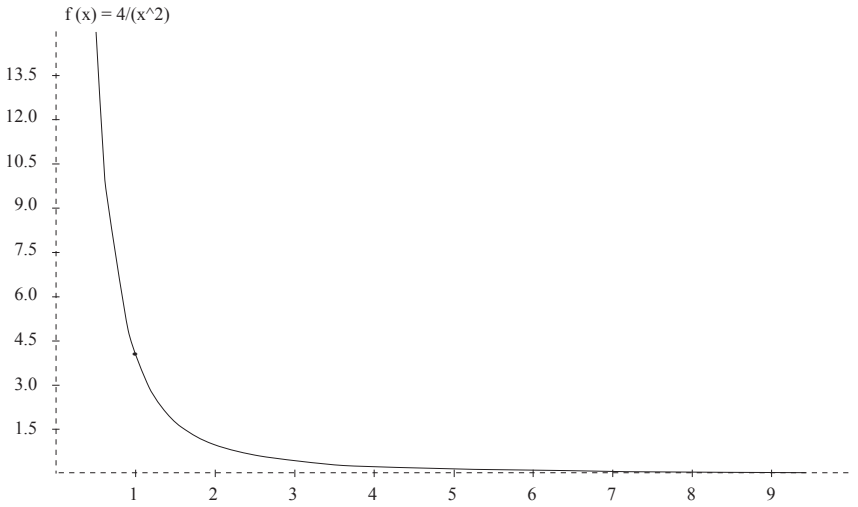
$$\beta\omega_s a_s^2 - 4\sigma\omega_s > 4(1-\sigma) \Rightarrow \omega_s > \frac{4(1-\sigma)}{\beta a_s^2 - 4\sigma}$$

and since:

$$1 > \omega_s > \frac{4(1-\sigma)}{\beta a_s^2 - 4\sigma} \Rightarrow \beta a_s^2 - 4\sigma > 4 - 4\sigma \Rightarrow \beta > \frac{4}{a_s^2}$$

This relationship between β and a_s is illustrated in Fig. 1, where, for example, $\beta \approx 5$ when $a_s = 1$:

FIGURE 1
f(x) ≡ *β*, *x* ≡ a_s, $\beta \equiv 4/a_s^2$



The highest value a_s can take on is around 9 while it appears that it tends to zero as β tends to infinity; indeed, the marginal utility from the public good and the slope of the marginal utility curve are inversely related by definition. Calibrations should reflect this relationship, given that both solutions described by (10) are acceptable. The numerator of the solution with the negative square root, is positive because:

$$(\beta\omega_s a_s)^2 > (\beta\omega_s a_s)^2 - 4\beta\omega_s\left[1-\sigma(1-\omega_s)\right] \Rightarrow 0 > -4\beta\omega_s\left[1-\sigma(1-\omega_s)\right]$$

which is true. Also, positive will be the numerator in the case of the positive square root, since:

$$(\beta\omega_s a_s)^2 > 2\beta\omega_s\left[1-\sigma(1-\omega_s)\right] \Rightarrow \beta\omega_s a_s^2 > 2\left[1-\sigma(1-\omega_s)\right]$$

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which is true, because $\Delta > 0$ if: $\beta\omega_s a_s^2 > 4\left[1-\sigma\left(1-\omega_s\right)\right]$, which implies that $\beta\omega_s a_s^2 > 2\left[1-\sigma\left(1-\omega_s\right)\right]$ as well. In sum, both solutions in (10) are acceptable, given that their denominator is positive too.

Now, letting $z \equiv \tau, \omega_s \equiv x \in (0,1)$, and $y \equiv q_s \in (0,10)$, we obtain the following simulations of (8) through *wolframalpha.com*:

Figure 2(a)
τ under: β = 15, a = 0.5, σ = –0.5

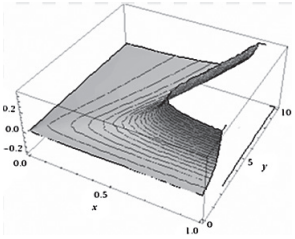


Figure 2(b)
τ under: β = 2, a = 2, σ = –0.5

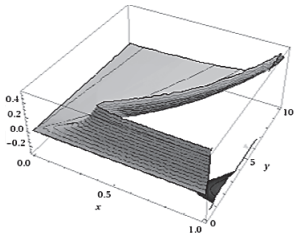


Figure 3(a)
τ under: β = 15, a = 0.5, σ = –1

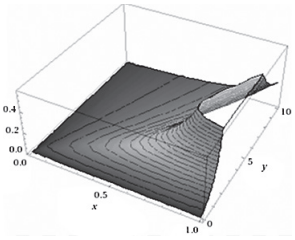
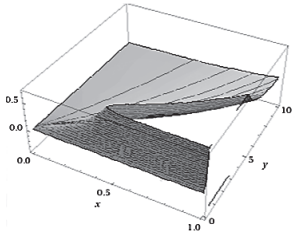


Figure 3(b)
τ under: β = 2, a = 2, σ = –1



Note at first that experimentations with the scale of were found to change only the scale of axis. Note also that in all four diagrams there is a ridge running from the origin of the three axes to some maximum value of the specific-tax rate, which is the highest the calibrations can give. The points along the ridge reflect the optimal combinations among tax rate, public firm size, and public sector output. They comprise a stable locus. Contrasting the figures based on a steep marginal utility curve on the left, with those on the right where this slope is much smaller, one concludes that the optimal size of the state firm and of its output increase as the slope becomes larger. The tax rate becomes smaller, because the output of the private complementary goods increases, too. The intuition here is that the faster the rate at which one unit of the merit good provides its utility, the more units of this good have to be provided in order to satisfy demand once there is no option of subsidized non-merit goods. Also, comparing the diagrams on the top with those at the bottom, one infers that these increases in public sector magnitudes become greater as complementarity becomes stronger, with the difference becoming smaller as the slope of marginal utility curve becomes smaller, too. The stronger the complementarities in the eyes of the consumer, the more the public firm and by complementarity, the private firms have to produce. Moreover, in all four figures, any attempt to increase output (size)

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away from the locus, will increase size (output) unless τ is reduced, limiting the expansion of both, with the reduction of τ being larger when complementarity is stronger. That is, any movement away from the locus will destroy the market of non-merit goods. These conclusions are crosschecked mathematically in the Appendix.

Next, $t \equiv z$ is simulated based on (10) and under: $x \in (0,1)$, $y \in (0,10)$ again, and $\beta = 2$, $a = 2$, $\sigma = -1$:

Figure 4(a)
t under: $(p_1q_1 + p_2q_2) = 40, \tau = 0.1$

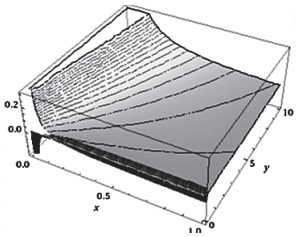


Figure 4(b)
t under: $(p_1q_1 + p_2q_2) = 80, \tau = 0.1$

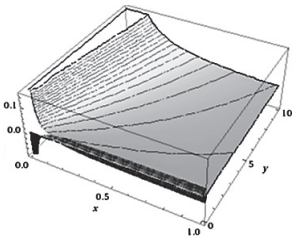


Figure 5(a)
t under: $(p_1q_1 + p_2q_2) = 40, \tau = 0.2$

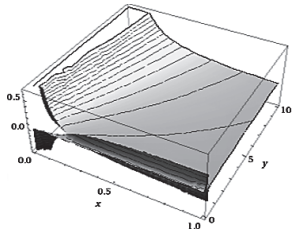


Figure 5(b)
t under: $(p_1q_1 + p_2q_2) = 80, \tau = 0.2$

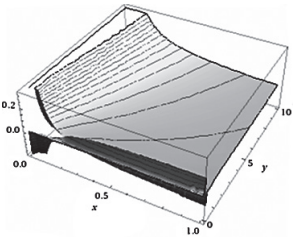


Figure 6(a)
t under: $(p_1q_1 + p_2q_2) = 40, \tau = 0.3$

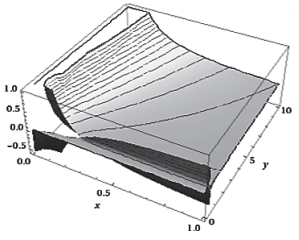
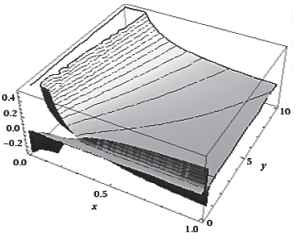


Figure 6(b)
t under: $(p_1q_1 + p_2q_2) = 80, \tau = 0.3$



If the figures on the left are compared with those on the right, *t* decreases considerably as the value of the private sector goods increases, because presumably the tax base increases. Also, comparing the diagrams by rows and columns, we can see that *t* increases faster in response to increases in *τ* as the value of the private goods becomes smaller, because, apparently, of the difference in tax base. Moreover, note that now, there is no optimal locus, the pattern of contours suggesting that

once they become parallel to each other, a certain public firm size can accommodate the provision of very large quantities of the merit good under a modestly increasing t. They also suggest that the same quantities might be provided under a smaller size but at higher t 's. These conclusions are based on the tendency of the parallel contours to be slightly upward sloping starting from some minimum configuration of t, ω_s and q_s. In sum, *ad valorem* taxation is more flexible and less antagonizing of the private sector firms relative to revenue neutral specific taxation under consumer sovereignty, but the latter type of excise taxation is more precise in terms of optimality. The difference in optimal private sector size implies that specific taxation induces a private-firm structure prone to realizing economies of scale that are high relative to the case of *ad valorem* taxation. That is, specific taxation fosters not only consumer sovereignty, but also production efficiency. Given additionally the efficiency under which the public firm is supposed to operate, specific taxation is more compatible with overall Pareto efficiency than *ad valorem* taxation.

3 CONCLUDING REMARKS

There is the possibility that both taxes are associated with the same increase of private goods' output; the specific one, as the result of the tax rate decrease prompted by the increased efficiency of smaller firms after the tax, and the sales tax, because of the tax rate decline induced by higher production capability on the basis of larger post-tax private-firm size *vis à vis* producer size under the sales tax. There is no way to check this out in the framework of this paper. But if it is true, and both taxes are consistent with overall Pareto efficiency, then, insofar as the financing of merit goods is concerned, the ultimate choice between the two taxes is the institutional attitude towards the size of the private sector. Commodity, in general, taxation has been found here to be welfare enhancing not only because of the macroeconomics of "supply creates its own demand", mentioned in the introductory section and verified more or less by the calibrations, but because also of the analytical context of differentiated oligopoly (Cremer and Thisse, 1994) subsumed by the use of quasi quadratic utility (Choné and Linnemer, 2019). It is also a Lindahl-Foley context, but with respect to complementary goods, verifying the conclusion that a Walrasian equilibrium does exist in quasilinear markets for such goods, too (Azevedo, Weyl and White, 2013). It would still exist under weak Pareto optimality if the preferences for merit goods were assumed to be pathological (as del Mar Racionero (2001) assumes), but coming out of intergenerational altruism (Raut, 2016), given that health and education do hinge upon intergenerational concerns.

Of course, there is a number of critical assumptions behind our results, which need to be rechecked by a broader analytical framework, especially with respect to the choice of utility function, the hypothesis of general complementarity, and the Lindhal-Foley apparatus. For example, all prices here have been conjectural, but the optimum can still be decentralized, and complementarity between merit and non-merit goods can still be possible. Yet this is a feature of the paper that,

according to Diamantaras, Gilles and Scotchmer (1996), may not hold under different assumptions, unless at least the postulate about general complementarity is relaxed. Moreover, although our Walrasian equilibrium under general complementarity presupposes a largescale economy, having subsequently countrywide relevance, the optimal scale justified by a model setting differing from ours may be the local jurisdiction. Furthermore, although one might contend in view of Levaggi and Menoncin's (2008) findings that our results are robust to the qualification of tax evasion because simply they refer to merit goods provision − qualification making sense if these goods exist already in the economy and consumers choose on the basis of after-tax income − this viewpoint needs to be reassessed. In any case, the comparative statics should have the macro-dynamic character originating in the transition from a pre-merit good *status quo* to the new equilibrium following the introduction of such a good in the economy.

The bottom line is that the provision of merit goods can serve as an engine of economic growth and development in a free market economy. The paper was not written to support this claim; this thesis merely stemmed from a theoretical argument illustrated through calibrations and motivated by the empirical evidence that these goods and complement private consumption. It is a position stripped of any ethical directives, and is irrelevant conceptually to concerns about the efficiency of public education and/or health provision. After all, health and education are social capital, boosting productivity and growth (Brooks and Nafukho, 2006), conferring at least short- and long-term well-being as well, even if the Easterlin paradox is correct (Bartolini and Sarracino, 2014). Nevertheless, it is a proposition that might complement the quests for merit goods as means of alleviating the income inequality that undermines the system of free enterprise, and of internalizing by the state such psychological externalities as multiple preference orderings and the failure of agents to choose in their own best interests (Mann, 2006).

Disclosure statement

No potential conflict of interest was reported by the author.

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APPENDIX

The results from Figs. 2 and 3, appear to be at variance with the intuition that $d\omega/d\beta < 0$, coming out of the total differential: $d(\partial^2\Gamma/\partial q^2)$. The reason is, certainly, the presence now of τ. Solving (8) for ω_s, and differentiating with respect to β, yields that:

$$\left.\frac{\partial \omega_s}{\partial \beta} = -\frac{\tau^2 q_s^2 (1-\sigma)(a_s q_s - 1)}{\left[\tau\left(\beta a_s q_s - \beta - \sigma q_s^2\right) - \sigma q_s\right]^2}\right\} \begin{matrix} > 0 \ iff \ (a_s q_s - 1) < 0 \\ < 0 \ iff \ (a_s q_s - 1) > 0 \end{matrix}$$

The calibrations assume that $(a_s q_s - 1) > 0$, and the sign of the derivative: $d\omega/d\beta$ appears that it should "continue" being negative. But, note that:

$$\left.\frac{\partial \omega_s}{\partial q_s} = \frac{\tau q_s (\tau\beta a_s q_s - 2\beta\tau - \sigma q_s)}{\left[\tau\left(\beta a_s q_s - \beta - \sigma q_s^2\right) - \sigma q_s\right]^2}\right\} \begin{matrix} > 0 \ iff \ \tau > \sigma q_s / \left[\beta (a_s q_s - 2)\right] \\ < 0 \ iff \ \tau < \sigma q_s / \left[\beta (a_s q_s - 2)\right] \end{matrix}$$

which in our calibrations holds with the positive sign, because $(a_s q_s - 2) > 0$ has been postulated, too. Now, letting all expressions below incorporate the assumption that $\sigma < 0$: $\partial\omega_s/\partial q_s > |\partial\omega_s/\partial\beta|$ *iff*:

$$\tau > \frac{\sigma q_s}{\left[q_s (1+\sigma)(a_s q_s - 1) - \beta (a_s q_s - 2)\right]}$$

which is true, because if the result: $d\sigma/d\beta < 0$, which obtains in connection with: $d(\partial^2\Gamma/\partial q^2)$, is to continue holding in the presence of taxation, the denominator of:

$$\frac{\partial \sigma}{\partial \beta} = -\frac{\tau^2 q_s^2 (1+\sigma)(a_s q_s - 1)}{\tau q_s^2 \left[q_s (\tau q_s - 2\tau\sigma - 1) - \beta\tau (a_s q_s - 1)\right]}$$

has to be positive, given a positive numerator, implying, in turn, that:

$$\tau > \frac{q_s}{q_s (q_s - 2\sigma) - \beta (a_s q_s - 1)}$$

and hence:

$$\tau > \frac{q_s}{q_s (q_s - 2\sigma) - \beta (a_s q_s - 1)} > \tau > \frac{\sigma q_s}{\left[q_s (1+\sigma)(a_s q_s - 1) - \beta (a_s q_s - 2)\right]} \Rightarrow$$

$$(a_s q_s - 1)\left[q_s (1+\sigma) - \sigma\beta\right] > \sigma q_s (q_s - 2\sigma) + \beta (a_s q_s - 2)$$

which is also true given the values chosen for the calibrations. Also, since, $\tau > q_s / \left[q_s (q_s - 2\sigma) - \beta (a_s q_s - 1)\right]$:

$$\frac{\partial \omega_s}{\partial \sigma} = \frac{\tau q_s^2 \left[q_s (\tau q_s - 2\tau\sigma - 1) - \beta\tau (a_s q_s - 1)\right]}{\left[\tau\left(\beta a_s q_s - \beta + \sigma q_s^2\right) + \sigma q_s\right]^2} > 0$$

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Moreover, continuing to incorporate in the expressions that $\sigma < 0$:

$$\frac{\partial \omega_s}{\partial \tau} = \frac{(1-\sigma) q_s^3 \sigma}{\left[\tau\left(\beta a_s q_s - \beta + \sigma q_s^2\right) + \sigma q_s\right]^2} > 0$$

and, we have the total differential:

$$d\omega_s = \frac{\partial \omega_s}{\partial q_s} dq_s + \frac{\partial \omega_s}{\partial \sigma} d\sigma + \frac{\partial \omega_s}{\partial \tau} d\tau - \frac{\partial \omega_s}{\partial \beta} d\beta$$

The results from the calibration reflect this algebra. They are plausible because according to Fig. 1, there cannot be that: $(a_s q_s - 1) < 0$, and because they are not influenced by the scale of $q_s \equiv y$.

The Future of Pension Plans in the EU Internal Market - Coping with Trade-Offs Between Social Rights and Capital Markets

NAZARÉ DA COSTA CABRAL and NUNO CUNHA RODRIGUES (Eds.)
Springer, Cham, 2019, pp. 349

Book review by PREDRAG BEJAKOVIĆ*
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Pension systems around the world are in more or less serious problems. The reasons are manifold, and are primarily caused by demographic changes (increased longevity and decreased natural growth) but are also systemic (the high outlays on pension expenditures that have a relatively small - or at least an insufficient - impact on the well-being of the older population). The new publication *The Future of Pension Plans in the EU Internal Market - Coping with Trade-Offs Between Social Rights and Capital Markets*[1] published by Springer provides new light on the situation and possible solutions for the phenomenon.

In the introduction the editors briefly explain the goal of the publication and the contributions by particular authors. In the circumstances of the period after the serious financial and economic crisis, pension systems are at a crossroad between the development of the inner capital market and the outlook of a new role of the EU regarding social policy. Such a policy should be an efficient response to common challenges, like the digital revolution, ageing, globalisation, new forms of work and the future of employment.

The first section begins with the contribution of Miguel Coelho dedicated to a characterization and the comparability of old-age pension systems. The author divides the mentioned pension models according to three principles: (a) capitalised versus unfunded systems, (b) actuarial *versus* non-actuarial systems, and (c) defined benefit (DB) *versus* defined contribution (DC) systems. The author concludes that a capitalised system, with defined contributions and actuarial fairness, has advantages over a PAYGO system because it enables improved protection against demographic changes, has limited financial liabilities, enables the development and strengthening of capital markets and better prevents politicization of the pension system.

Boulhol and Lüske in their contribution analyse what is new in the discussion about a PAYGO system (where there is a transfer from current employees to current pensioners) as against funded pensions (current workers save a part of their contributions which are invested in the financial market and then used to pay pensions when people retire). The authors explain that the relative benefits and costs of a shift from the previous to the second mostly depend on whether the observed economy is sufficiently dynamically efficient. Boulhol and Lüske point out that this shift creates winners and losers and therefore necessarily entails some new arrangement of redistribution.

Yves Stevens examines the role of the government in creating, or improving access, to funded or unfunded pension systems. He assesses the models of capitalised or PAYGO systems not only from the standpoint of risk sharing, but also from the historical and ideological basis of different notions of pension models and their causal meaning and significance. *It is the role of a government to decide on the spread of these risks.* The term *pension* has multiple meanings with different connotations, leading to what the author titles *a national pension identity*.

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In a number of OECD countries, in addition to PAYGO models, over time occupational pensions have been developed. These models often started out in particular sectors before becoming widely accepted and affect a significant part of the labour force. Maria Teresa Garcia identifies the main causes of the move from DB to DC plans. The shift is present in most of the developed countries, and therefore risks related to retirement and financial affairs are transferred to individuals.

Most OECD countries during the last 20 years have recorded adverse demographic trends primarily due to ageing populations. Falilou Fall pays attention to important issues of the sustainability and adequacy of different pension systems across OECD members. With the goal of improving sustainability, many countries have reformed their pension systems by a combination of different policy measures.

The second section of the book begins with the contribution by Belke and Allroggen dedicated to the analysis of the capital markets union (CMU) and its role in saving for retirement. The CMU has two main aims: improving investment opportunities across Europe and enhancing financing options for business. The CMU aims for a more stable and resilient financial sector through deeper integration, creating a single market for capital by eliminating barriers to cross-border investments and improving access to financing for all business around the EU.

Gabriel Bernardino examines the measures for solving the problem of the increasing financial gap between what people expect to obtain as their retirement income and what they actually will receive. The author addresses the role of improved regulation and the importance of supervisory authorities, particularly the European Insurance and Occupational Pensions Authority, in regaining trust in pension plans and products in the conditions after the economic crisis. Recent corporate failures have clearly shown the risk that pension fund members might lose a considerable part of their retirement income and have confirmed that the potential effects of the current insufficient financial resources are not to be neglected.

Davoine and Forstner examine the long-term effects on the pension system of separate and integrated capital markets. The latter case, obtained through a capital market union, is more beneficial if other countries in the market union have PAYGO systems. Households in a country that has introduced a capitalised pension system would enjoy long-term welfare gains in a scope between 0.3% and 0.5% of lifetime consumption if the country is in a capital market union, compared to separated capital markets. The main reason is that a capital-funded pension system results in a growth of national savings, since contributions that are collected are saved for future consumption, instead of being immediately consumed by pensioners in a country with a PAYGO system.

As a measure for improvement of the unfavourable financial situation in Portugal, Merton, Muralidhar and Pinto Ferreira propose the introduction of a new innovative type of sovereign contingent debt instrument. This consists of standard-of-living

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indexed, forward starting income-only securities – SeLFIES. Such an instrument can simplify retirement planning, ensure retirement security, and also improve the government's possibilities for debt financing and funding the construction of infrastructure.

Nuno Cunha Rodrigues examines the role of the PEPP and the CMU as measures to address the fact that pension rights are not portable across EU borders. The most important aim of the PEPP is to boost the cross-border mobility by providing a possibility for people who have worked or intend to work in various EU Member States. Several measures have already been taken towards stronger coordination of national economic and monetary policies intended to mitigate the impact of factors that hinder mobility.

Karel Lannoo is quite sceptical of the final success of the PEPP. The reason is that the unclear, unattractive and unsuitable text agreed between the European Parliament (EP) and the EU Council is not likely to be useful in practice. Due to heavy pressure from various sides, the text was fragmented, watered down or replaced so the final version of the PEPP was disappointing. The text in the final form has become applicable only to individual pension voluntary savings in the third pillar.

Publicized in February 2019, as an instrument to enhance the portability of pension rights, the PEPP did not solve problems related with the deepening financialization within the EU and the linked negative consequences for pension regimes. Caldas explains the key aspects of financialized and stresses that due to various factors (primarily because of complex, non-transparent and not standardized decision making processes), measures for establishing a Capital Markets Union did not achieve the desired results. Therefore, the EU is still actively searching an optimal model for reviving the role of financial markets in the EU, the development of the CMU and implementation of the PEPP as its important instrument.

The last section of the book is dedicated to a new opportunity for the EU Social Policy. Nazaré da Costa Cabral writes about an optimal development of pension systems that should choose between paying more respect to social rights or being more oriented towards financial markets. The author offers two hypothetical alternatives for the future proposal of pension schemes: the personal insurance model and the universal tax-financed model.

The notion *European social model* is quite often used in public discussion, but with numerous political connotations. It is a theme of interest for Pedro Adão e Silva and Patrícia Cadeiras. The authors offer an interesting historical overview of social policy in the EU, since the original Treaties until the present circumstances. After more than 60 years of integration, the core of the social policies continues to be under the control of nation states. The soft nature of such a policy may be a

most important asset to ensure the required flexibility in response to the various challenges from demographic changes to the new forms of work.

Spasova, Louvaris Fasois and Vanhercke discuss the main trends of pension reforms in EU member states in the period 2014–2019, looking at how the issue of pension adequacy has been solved. Fully aware that adequacy and sustainability in pension systems are closely intertwined, they analyse reforms related to prolonging working lives; measures for the protection of pension adequacy; and actions for preserving income during retirement. Although pension insurance mostly remains a national competence, one should not neglect the influence and significance of various proposals by the World Bank and the IMF. In approximately the last 20 years, the EU also became an important factor contributing to pensions' policy mostly through the Open Method of Coordination and the European Semester.

Wöss and Türk challenge conservative opinion on the sustainability of the pension systems, deeming that the best solution for pension adequacy and sustainability is an increase in employment rates. As a positive example for measuring the dependency ratio, the author presents the 'dependency ratio calculator' developed by the Austrian Chamber of Labour. The instrument applies graphics of the age structure and economic status of population to calculate demographic and economic dependency ratios. Successful integration into the labour market of all working age persons would significantly improve the future economic dependency ratios and, therefore improve pension adequacy and financial sustainability.

Ivana Vukorepa, from the Faculty of Law, University of Zagreb, together with Joren and Strban, explains how ageing societies and society fluidity can impact pension schemes and coordination rules at the EU level, for both the 1st and the 2nd second pillars of pension insurance. Fluidity in this context means new patterns of (organising) work and mobility, or in other words non-standard or unstable forms of employment (like fixed-term contracts, telework, part-time work, traineeships and student work, temporary agency work), which are often not included in pension insurance.

It is a demanding task to sum up all the praiseworthy messages from this really excellent book. Briefly, as mentioned earlier, there are no optimal pension models and the reform process should take into account the context in which the reforms are being implemented. Depending on the setting, the adoption of a particular approach and given model may have different outcomes. The goal of the adopted measures and the numerous reforms was to lower public expenditure. To address such complex and demanding tasks, a number of policy ideas have been developed and various proposals prepared, but, without doubt, further systematic efforts will be needed.


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