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Welfare State and Social Spending: Assessing the Effectiveness and the Efficiency of European Social Policies in 22 EU countries

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Abstract

This paper aims at analysing the effectiveness and the efficiency of social public expenditure in 22 European countries. We follow Antonelli and De Bonis (2017) presenting a basic theoretical framework connecting the choice of the level of social protection to the median voter's preferences and the inefficiency of expenditure. To test it against real data, we construct performance and efficiency indicators. While the existing literature measures the performance of social policy restricting the analysis to its impact on inequality and the labour market, our index summarises the outcomes achieved in all sectors of social protection (family, health, labour market elderly, disabled, unemployment, inequality). Based on this, we find that the ranking of countries differs from those found in the literature. We extend the previous analysis of Antonelli and De Bonis (2017) putting together performance and the amount of expenditure needed to achieve it (to better compare countries, we use social public expenditure net of tax and transfers), constructing efficiency indicators and a production possibility frontier through the FHD method. We find that efficiency is not related to the size of public intervention. Rather, our results suggest that population size and the type of the welfare system might be more relevant factors: small countries tend to be more efficient than large ones and targeting all sectors of social policy tends to be more efficient than concentrating on some areas only.

JEL classification: H11; H53; I3.

Keywords: Median Voter Model; Social Performance Index; Social Expenditure Efficiency; Free Disposable Hull; Production Possibility Frontier

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1. Introduction

The effectiveness and efficiency of social public expenditure in European countries has been the object of political and theoretical debate along the convergence path undergone by national welfare systems (Mandl *et al*., 2008). This is taking place as an effect of common factors, like the economic crisis, an ageing population, and the working of European guidelines.

Within this debate, the aim of this paper is to study the outcomes and the efficiency of social policies in European countries as they appear in 2013, the last year for which it is possible to obtain data for a fairly large number of countries (22). We do this through three steps.

First, we present- as in Antonelli and De Bonis (2017) - a basic median voter model that connects the choice of social benefits level to the efficiency of social expenditure and to preferences for private goods and welfare services. Coherently with the risk protection function of welfare systems, we assume that the relative weight of publicly provided social protection services within the utility function increases as the individual moves down the income distribution.

Second, we construct an aggregate indicator for social protection performance, meaning for that the achievement degree of social policy goals. The bulk of the existing literature on the performance and efficiency of the public sector considers either general government expenditure (see, among others, Afonso and Kazemi, 2017; Afonso *et al*., 2005; Tanzi, 1998; Tanzi and Schuknecht, 2000) or expenditure for specific public services (Clements, 2002; Deprins *et*

al., 1984; Vanden Eeckhaut *et al*., 1993; Fakin and Crombrugghe, 1997; Gupta and Verhoeven, 2001), while studies addressing welfare states typically restrict the analysis of their impacts on three areas: economic growth; poverty and inequality; labour market rigidities (Boeri, 2002; Sapir, 2005; Caruana, 2010). The performance index we present, instead, summarises the outcomes achieved in all sectors of social protection, as specified in the OECD Social Expenditure Database (SOCX): family, health, labour market, elderly, disabled, unemployment, and inequality (Antonelli and De Bonis 2017).

Third, we extend the previous analysis analysing social public expenditure efficiency: putting together performance and expenditure needed to achieve it, we construct efficiency indicators for the 22 European countries in 2013; then, using the performance indexes in a Free Disposal Hull (FDH) analysis, we construct a possibility frontier and derive country scores for input and output efficiency.

The paper proceeds as follows. Section 2 presents the theoretical framework; the performance index and the inefficiency index are derived and tested against the predictions of the models in sections 3 and 4, respectively; section 5 extends the efficiency analysis through the FHD method. Section 6 summarises the main results of the paper.

2. The theoretical framework

We consider a basic median voter model.[1] The economy is composed by *N* individuals, who differ as for preferences and income endowments. The government provides social protection and finances it through taxation. The choice of the level of welfare services is the result of the maximisation of the median voter's utility function.

2.1 The government

The government provides welfare services. For simplicity, these are considered as a composite good of unitary cost and price. Each beneficiary receives an amount *g*, that can thus be interpreted either as a vector of services[2] or as the implicit income deriving from it.

Let us call Ñ the number of beneficiaries and $\beta = \frac{\tilde{N}}{N}$ the corresponding share of population receiving welfare benefits. The number of people receiving welfare benefits and the amount of assistance paid are determined by eligibility and entitlement rules.

According to the definitions in Saunders (1991), eligibility derives from the specification of the categories of the population qualifying for consideration for assistance; entitlement, instead, refers to the set of rules that determine the

[1] We describe in this section the model presented in Antonelli and De Bonis (2017). Even if we consider a closed economy, our references in the economic literature are the models in Brueckner (2000) and Razin and Sadka (2005).

[2] These services can be either "categorical" cash transfers (for instance, old age, unemployed, disabled), or services having the characteristics of pure public goods (for instance, in the areas of health, inequality, labour market, family).

amount of benefits received by those who are eligible, according to some claimant's characteristics.[3]

In our framework, the amount of benefits is the same for all recipients. Thus, we will call β the *eligibility parameter*, defining the share of the population eligible for the provision of social assistance. The case of $\beta = 1$ applies to a welfare system providing social services to all individuals, while $\beta < 1$ corresponds to a welfare system targeting only some categories of the population, based on exogenously given eligibility criteria. Changes in the amount of social protection that each beneficiary is entitled to receive are, instead, represented by a change in the level of g. Total welfare services provided will thus amount to $g\ \beta N$.

This can differ from the amount needed to finance them, because of inefficiencies in the transfer process. These can stem from the spending side, that is, some resources are wasted in the process of being distributed to beneficiaries,[4] and from the revenue side, that is, funds are collected by means of distortionary taxation. In what follows, we concentrate on inefficiency in expenditure.

Thus, total welfare expenditure is given by

$$S = \alpha g \beta N, \qquad \alpha \geq 1, \tag{1}$$

[3] For the effects on eligibility and entitlement rules in the health care sector see Swann (2010).

[4] When the production/provision is not realised at the minimum cost. See, for example, the public choice literature, in particular the seminal work by Migué and Bélanger (1974).

where α is the *inefficiency parameter*. The case of $\alpha = 1$ corresponds to an efficient provision of welfare services, while α will exceed 1 in the presence of waste, a higher level of α corresponding to a larger waste.

Welfare benefits are financed by means of a fixed tax and the government budget constraint imposes that total revenues, *R*, equal total expenditure, *S*:

$$R = S. \qquad (2)$$

As for the individual contribution, we distinguish two cases.

Case 1. All *N* individuals pay the fixed tax. Then, given eqns. (1) and (2), the welfare cost for each individual, *T*, is given by:

$$T = \frac{R}{N} = \alpha\beta g. \qquad (3)$$

Case 2. Those who are eligible for receiving welfare services do not contribute. Note that this case applies only if $\beta < 1$; then, the individual contribution paid by the fraction (1-β) of the population will be given by:

$$T = \frac{R}{N-\tilde{N}} = \frac{\alpha\beta g}{(1-\beta)}. \qquad (3')$$

2.2 The individual utility function

We assume that individual utility depends on *g* and on disposable income, that is, income net of the flat tax raised by the government to finance welfare expenditure. We assume that each individual *i* maximises the following Cobb-Douglas utility function:

$$U_i = g^{k_i}(Y_i - T)^{(1-k_i)}, \qquad (4)$$

where Y_i is individual *i*'s income, considered exogenous.[5]

Note that *g* enters the utility function irrespective of whether the individual directly receives welfare services or not. This feature intends to capture the risk reducing function of welfare systems, connected to the ability of the government to handle moral hazard problems better than private companies in providing income insurance (see, for instance, Buchanan and Tullock, 1965; Sinn, 1995).[6]

Individuals differ as for Y_i and k_i. In particular, we assume that k_i depends on the relative position of the individual within income distribution, being positively correlated to the ratio $\frac{\overline{Y_{min}}}{Y_i}$. Let us assume that:

$$k_i = \frac{Y_i + \overline{Y_{min}}}{2Y_i},$$

where $\overline{Y_{min}}$ is the upper bound level of the first decile (i.e., the 10% of people with lowest incomes). Thus, the relative weight of *g* within the utility function increases as the individual moves down the income distribution.

This is in line with the risk protection function of the welfare system mentioned above and with the suggestion that individuals become increasingly risk averse as they move closer to poverty (Wagstaff, 2000; Marduch, 1995).

[5] For welfare recipients, *T* would equal 0 in case 2.

[6] Different explanations are altruism, that is, concern for others, through the interdependence of the utility functions (Mishan, 1972) or the intent of ensuring social cohesion (Brennan, 1973).

2.3. The government maximisation problem

The level of *g* is decided by majority voting; thus, the government maximises the median voter's utility function subject to the budget constraint (eqn. (2)):

$$\max_g U_m = g^{k_m}(Y_m - T)^{(1-k_m)} \qquad (5)$$

s.t. eqn. (2)

where *m* denotes the median voter.

Since $k_m = \frac{Y_m + \overline{Y_{min}}}{2Y_m}$, its value increases as the median voter's income comes closer to $\overline{Y_{min}}$.

The connection between welfare expenditure and the distribution of income that this implies is different from the one analysed in the political economy literature. As suggested in Downs (1957) and Meltzer and Richard (1981), majority voting can explain redistributive expenditure on the basis of the shape of the income distribution.

Typically, the bulk of the distribution consists of many small incomes, with some very large incomes in its extended tail. Thus, the median voter income will be less than that of the mean voter, with majority voting leading to redistribution from the richer minority to the poorer majority.[7]

In our model, redistribution is not the driving force, since the median voter

[7] See also Persson and Tabellini (1994) and Alesina and Rodrik (1994); for recent theoretical extensions and empirical tests, see, among others, Milanovic, 2000, and Barnes, 2013.

need not be among the net beneficiaries of the system.[8] The position in the distribution of income, instead, is relevant for determining the intensity of preferences according to the insurance motive.

2.3.1 The optimal solution

We consider two cases of the maximisation problem.

Case 1

In case 1, *T* is given by eqn. (3); by using it and substituting from the budget constraint (2) into (5), one obtains the following objective function, *W*:

$$W = g^{k_m}(Y_m - \alpha\beta g)^{(1-k_m)}. \tag{6}$$

By applying a log-linear transformation, eqn. (6) becomes:

$$k_m log(g) + (1 - k_m)\log(Y_m - \alpha\beta g). \tag{7}$$

The F.O.C. is:[9]

$$\frac{dW}{dg} = \frac{k_m}{g} + \frac{1 - k_m}{Y_m - \alpha\beta g}(-\alpha\beta) = 0$$

that yields:

[8] This feature can, however, be captured in case 2, if the median voter belongs to the targeted categories and therefore benefits from welfare expenditure without contributing to it.

[9] The F.O.C. is sufficient for a maximum, given the usual assumptions on the concavity of the utility function and the linearity of the constraint.

$$g^* = \frac{k_m Y_m}{\alpha\beta}. \qquad (8)$$

Case 2

In case 2, *T* is given by eqn. (3'); by using it and substituting from the budget constraint (2) into (5), the objective function becomes:

$$W = g^{k_m}\left(Y_m - \frac{\alpha\beta g}{1-\beta}\right)^{(1-k_m)}. \qquad (6')$$

By taking logs as above, the F.O.C. yields:

$$g^* = \frac{k_m(1-\beta)Y_m}{\alpha\beta}. \qquad (8')$$

Based on these results, one can state the following claims.

Claim 1. *The equilibrium amount of welfare services to which each beneficiary is entitled increases as the ratio between the upper bound income level of the first decile and the median voter's income increases*.

Proof. The proof is straightforward by inspection of eqns. (8) and (8'), recalling that $k_m = \frac{Y_m + \overline{Y_{min}}}{2Y_m}$, which increases with $\frac{\overline{Y_{min}}}{Y_m}$. Intuitively, the claim points out that social preferences are more oriented towards social protection services in societies with higher concentration in the lower tail of income distribution.[10]

Claim 2. *The equilibrium level of g increases in the median voter's income,*

[10] On the contrary, social preferences are more oriented towards private goods in societies with a greater concentration in the upper tail.

Y_m.

Proof. Let $k_m Y_m = z$. So, we have $z = \frac{Y_m + \overline{Y_{min}}}{2Y_m} \cdot Y_m$. Thus, $\frac{\partial g}{\partial Y_m} = \frac{1}{2\alpha\beta}$. The same obtains by differentiating eqn. (8'). An increase in Y_m has a composite effect on the amount of social protection g*. As the median income increases, k_m decreases, with a negative effect on g^* (claim 1); however, there is also a positive direct effect, which prevails, thus generating a net increase of g^*. Conceptually, this means that social protection is a normal good and the demand for it increases with income.

Claim 3. *The equilibrium level of g is inversely related to the inefficiency parameter α and to the eligibility parameter β.*

Proof. The proof is straightforward by inspection of eqns. (8) and (8').

Proposition 1. *The values of the inefficiency parameter α and of the eligibility parameter β are inversely related at the optimum; the elasticity of β w.r.t. α is, in absolute value, equal to 1 in case 1 and smaller than 1 in case 2.*

Proof. The proof of the first part of the proposition is straightforward by inspection of eqn. (8) and eqn. (8'), respectively. As for the second part, in case 1, taking the total differential of eqn. (8), one obtains $-\frac{d\beta}{d\alpha}\frac{\alpha}{\beta} = 1$; this means that α and β are perfect substitutes, since a greater inefficiency can be compensated by an equal reduction in β. In case 2, taking the total differential of eqn. (8'), one obtains $-\frac{d\beta}{d\alpha}\frac{\alpha}{\beta} = 1 - \beta$. This is because a percentage change

in the share of beneficiaries corresponds to an opposite one in the share of tax-payers; thus, an increase in α is compensated by a decrease in β that is smaller than in case 1.

Claim (3) and proposition (1) present a simple illustration of how a reduction in social security expenditure can be achieved in either of the following ways: a) by improving efficiency (reduction of α); b) by restricting eligibility (reduction of β); c) by reducing the level of individual protection (reduction in *g*), which, if the amount of assistance received could vary across recipients, e.g. based on their income level, would correspond to a tightening in the entitlement rules.

Nowadays, in the face of budgetary pressures, governments are resorting to income and/or means testing to guarantee social support to the least well-off (Adema *et al*., 2014), following ways b) and c). Individual means test is referred to as selectivity; in its broader sense, the term also encompasses the narrowing of the scope of eligible categories. An alternative concept is that of targeting, implying the redirection of expenditure to those whose needs are greatest or whose means are lowest (Saunders, 1991).

These measures are commonly associated to an improved efficacy of policies, also hinting at an improved efficiency in the use of resources. This conclusion should, however, be taken with cautiousness: first, selectivity and targeting are not always successful (Gouyette and Pestieau, 1999); second, they can possibly be used as a substitute for waste reduction, if governments are unwilling or

unable to improve efficiency (proposition 1).

3. Testing the model against empirical evidence: outcome indicators for social policy

In this section, we want to test the previous model against empirical evidences. To this purpose, we use OECD and Eurostat data to calculate, first, a *social protection performance index* (*SPPI*) representing the outcomes produced by welfare policies in 22 European countries in the year 2013.[11] In general, social policy is a multidimensional policy when considering several sectors of action. In addition to categorical measures, providing benefits to selected categories of beneficiaries only (e.g., for old age, the disabled, the unemployed), there are more general policies with non-excludable benefits (labour market, health, income inequality, family).[12]

In this perspective, following Antonelli and De Bonis (2016, 2017), we first identify eight sectors indicators for seven areas of social protection expenditure[13]: family, health, labour market, elderly, disabled, unemployment, inequality. Then, we select outcomes indicators for each sector. These outcomes can also be interpreted as the achievement's degree of the targets set out by policy-makers for different social areas. As a second step, we construct

[11] We use the most recent available data where the 2013 data is missing.

[12] See note 2.

[13] The expenditures sectors are those included in the SOCX database. We use eight indicators because we consider poverty as an additional indicator for social policies (see Appendix).

a composite index, summarising all outcomes indicators and, therefore, representing the social benefit provided – on average – to citizens (the βg in the theoretical framework).

For each sector, we consider the following outcomes indicators correlated to the overall goal of the social policy in that sector: [14]

- ✓ *maternal employment and net disposable family income* for the family sector, since the related policies are mainly oriented towards reconciling work and family life - thus encouraging a greater women's participation in the labour market - and providing tax benefits (deductions and tax credits) or monetary transfers to families with children, to support their income level and, ultimately, in order not to discourage births;
- ✓ *life-expectancy* at birth for the health sector;
- ✓ *the unemployment rate* (in the three types of general, female and youth unemployment rate) to assess the performance of active labour market policies, that is, all those initiatives (such as training, work-related education, apprenticeships, careers guidance tools, etc.) designed to promote employment and work placement;
- ✓ *the net replacement rate*, i.e. the proportion of labour income (net of fiscal measures) which the national welfare systems respectively

[14] See the Appendix for details.

guarantee to the elderly and the unemployed after their exit from the labour market;

- ✓ *the monetary benefits* that, on average, national governments provide to the disabled (in the form of disability pensions or monetary transfers, to pay medical expenses and for care and assistance);
- ✓ *the Gini index* calculated based on after-tax and transfers disposable income for income inequality;
- ✓ *the poverty index* (calculated as the percentage of households with disposable incomes[15] at least 60 percent lower than the median national income) is considered as an indicator of the effectiveness of social policies aimed at ensuring a given standard of living.

3.1 Calculating the Social Protection Performance Index (SPPI)

Our performance index for the i^{th} country and j^{th} sector of social policy at time t is thus given by:

$$0 \le P_{i,j,t} = \frac{x_{i,j,t} - x_{\min,j,t}}{x_{\max,j,t} - x_{\min,j,t}} \le 1$$

i=1, 2...22 j= 1, 2,.....8

where $x_{i,j,t}$ is the value of the outcome indicator associated to the sector j of social policy in country i at time t, while $x_{min,j,t}$ and $x_{max,j,t}$ represent,

[15] The OECD "Income distribution and poverty" database refers to the "equivalised disposable household income", that is, household income net of taxes and inclusive of transfers received adjusted for household composition based on equivalence scales.

respectively, the minimum and maximum values for the same indicator within the group of the 22 countries under consideration. Therefore, the performance index ranges between 0 and 1. $P_{i,j,t} = 0$ indicates the case in which the i^{th} country exhibits the worst performance in the j^{th} sector at time t within the group of countries under consideration; conversely, $P_{i,j,t} = 1$ represents the best outcome in the j^{th} sector at time t for the i^{th} country[16].

For the sectors with several outcomes' indicators (for example family, labour market, elderly, unemployment, etc.)[17], we consider their average value, following the methodology used in calculating the Human Development Indices.[18] Finally, the aggregate indicator for the whole area of the social sector was obtained by adding together the individual partial indicators in accordance with the existing literature (Tanzi *et al.* 2000, 2006).[19] For country i at time t we thus have:

$$SPPI_{i,t} = \sum_{j=1}^{8} P_{i,j,t}$$

[16] To ensure that the highest values of the index are representative of the best performances, we transform three variables: the unemployment rate, the poverty index and the Gini index. In these cases, higher values of the index would indicate worse – and not better – performances for the country concerned. We therefore consider the complement to one of the preceding three outcome variables interpretable as the employment rate, a "welfare index" (representative of the percentage of households with disposable income of over 60 percent of the median disposable income) and an index of equidistribution of disposable income, respectively.

[17] See Appendix.

[18] Methodological notes available at the following link. http://hdr.undp.org/en/content/calculating-indices.

[19] We give equal weight to each sector indicator in compiling the aggregate performance indicator; the assumption is strong, but stronger alternatives are lacking. It facilitates the comparison with the existing literature, where either the same assumption is made (Afonso *et al.*, 2005) or some sectors are not considered at all (thus being assigned a zero weight).

Tab. 1 The *Social Protection Performance Index* (2013)

	Family	Health	Labour market	Old Age	Unemployment	Disability	Income inequality (Gini index)	Poverty	**Final Index 2013**
Country									
Austria	0,71546	0,73333	0,57357	0,78301	0,95459	0,27485	0,69231	0,71852	**5,44563**
Belgium	0,62240	0,66667	0,77395	0,31540	0,75814	0,29220	0,79487	0,44444	**4,66809**
Czech Republic	0,16766	0,34667	0,67284	0,44560	0,81737	0,02246	0,84615	0,90370	**4,22247**
Denmark	0,75796	0,62667	0,76844	0,75061	0,88648	0,67877	0,91453	0,88148	**6,26494**
Estonia	0,21755	0,21333	0,48165	0,35513	0,80454	0,05139	0,00000	0,00000	**2,12361**
Finland	0,62046	0,72000	0,58828	0,35330	0,80750	0,46712	0,84615	0,71852	**5,12133**
France	0,57597	0,88000	0,66917	0,41993	0,72162	0,21753	0,57265	0,71111	**4,76798**
Germany	0,60792	0,69333	0,69123	0,17665	0,97927	0,30079	0,58974	0,63704	**4,67597**
Greece	0,18520	0,76000	0,06802	0,54095	0,00000	0,01775	0,15385	0,23704	**1,96281**
Hungary	0,01661	0,00000	0,53313	0,89364	0,69398	0,00000	0,61538	0,51111	**3,26386**
Ireland	0,34385	0,72000	0,44121	0,09413	0,65647	0,06867	0,44444	0,59259	**3,36137**
Italy	0,23254	0,94667	0,69307	0,66748	0,51234	0,09884	0,30769	0,31111	**3,76974**
Luxembourg	0,82886	0,82667	1,00000	0,51223	0,87858	0,79827	0,68376	0,60741	**6,13577**
Netherlands	0,79851	0,76000	0,75925	1,00000	0,91412	0,32221	0,69231	0,69630	**5,94269**
Norway	0,73652	0,81333	0,70593	0,40159	1,00000	1,00000	0,93162	0,75556	**6,34456**
Poland	0,22776	0,18667	0,29230	0,24694	0,67522	0,01699	0,52137	0,48889	**2,65613**
Portugal	0,44781	0,68000	0,88242	0,45477	0,45508	0,07558	0,16239	0,30370	**3,46175**
Slovak Republic	0,04866	0,10667	0,64343	0,72555	0,53998	0,04050	0,78632	0,76296	**3,65407**
Slovenia	0,55499	0,62667	0,86220	0,29279	0,73445	0,02904	0,90598	0,62222	**4,62833**
Spain	0,30206	1,00000	0,69307	0,61064	0,08687	0,09320	0,12821	0,08889	**3,00292**
Sweden	0,78848	0,84000	0,44305	0,35147	0,76703	0,55008	0,68376	0,54815	**4,97201**
United Kingdom	0,56318	0,72000	0,00000	0,00000	0,80849	0,10657	0,02564	0,49630	**2,72018**

Source: Our elaborations on OECD and Eurostat Data

The final values are characterized by a high degree of heterogeneity within the group of countries considered, ranging from 1.96 (Greece) to 6.34 (Norway). Higher indicators (greater than the median value 4.43) are associated with the Nordic countries (Norway, Denmark, the Netherlands, Finland and Sweden) and Luxembourg, Austria, France, Germany, Belgium and Slovenia.

The disaggregated analysis of the index shows diversity in its composition. Performance levels of the "family", "health", "unemployment", "income inequality" and "poverty" sectors are higher in the Nordic systems (Norway, Denmark, Sweden, the Netherlands) and in some continental countries, notably Luxembourg. In the Mediterranean countries, in contrast, the better-performing components are represented by "health" and "the elderly", while markedly poor performances are highlighted by context indicators relating to the fight against poverty and to policies reducing income inequality. Anglo-Saxon countries perform well in the unemployment and poverty sectors.

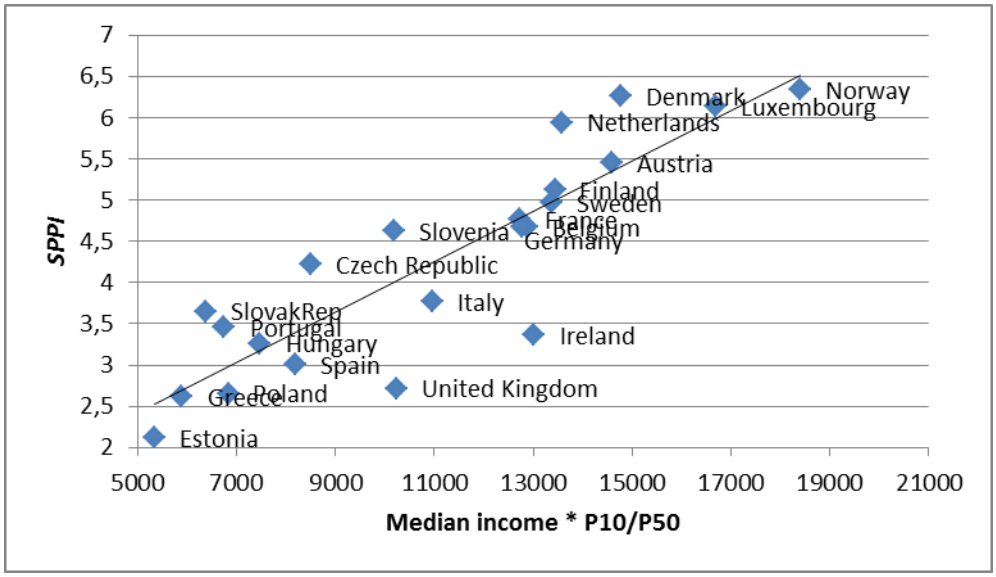
3.2 Performance, median income and distribution

Eqns. (8) and (8') imply that βg is directly related to kY_m. Given that $k_m = \frac{Y_m + \overline{Y_{min}}}{2Y_m}$, k_m increases with $\frac{\overline{Y_{min}}}{Y_m}$. This ratio corresponds to the inverse of the percentile ratio P50/P10, among the common measures of inequality, basically representing a distributional parameter (see claim 1).

Fig. 1 shows the relationship between our *SPPI* for the year 2013 and the average value of the product between the percentile ratio and the median income for the period 2009-2013 for the countries under consideration.[20]

[20] We take the average value of Y_m(P10/P50) for the period 2009-2013 to consider the lag between the outcome of social policies in a given year and the expenditure decisions of previous years.

Fig. 1 The *Social Protection Performance Index* and income distribution



Source: Our elaborations on OECD data (SOCX Database). Median income in PPP (US dollars)

What emerges is a positive relationship, which hints at an explanation of differences in national choices about the level of protection based on differences in the level and the position in the distribution of the median voter's income. This can be connected both to the redistribution and the insurance motives outlined in the previous section. Since the main objective of the paper is to analyse efficiency in social expenditure, we do not elaborate further on this finding, [21] turning, instead, to the analysis of social expenditure efficiency.

4. The inefficiency parameter

Our next step is to calculate the inefficiency parameter represented by α in the

[21] Additional results are available upon request.

theoretical framework. Since the per capita social expenditure is $\alpha\beta g$, the value of α is simply given by $\alpha\beta g$ divided by βg, estimated in the previous section. From a conceptual point of view, we are calculating the ratio between the input of social policy (expenditure) and the output (the SPPI).

As an estimate for $\alpha\beta g$, we take per capita net public social expenditure, as a share of GDP. In particular, we assume a lagged effect from expenditure onto performance: we thus take the average value of per capita net social expenditure over the period 2009-2013.[22]

We can now obtain an estimate of α computing an indicator for social expenditure inefficiency for each country, $SEII_i$. To do this, we weigh the logarithm of average per capita net social expenditure, $NPSE_i$, by $SPPI_i$: [23]

$$SEII_i = \frac{NPSE_i}{SPPI_i}.$$

[22] At constant prices. The method is similar to the one applied in Afonso *et al.* (2005), therefore most of their caveats also apply. Thus, we are aware that public expenditure data are not always fully comparable among countries and that its impact on performance cannot be always separated by that of other factors. Note that the existing literature uses gross social expenditure; instead, by using net social expenditure, we can correct for differences across countries stemming from different taxation levels on social benefits.

[23] The values of the indexes only give an ordering of countries.

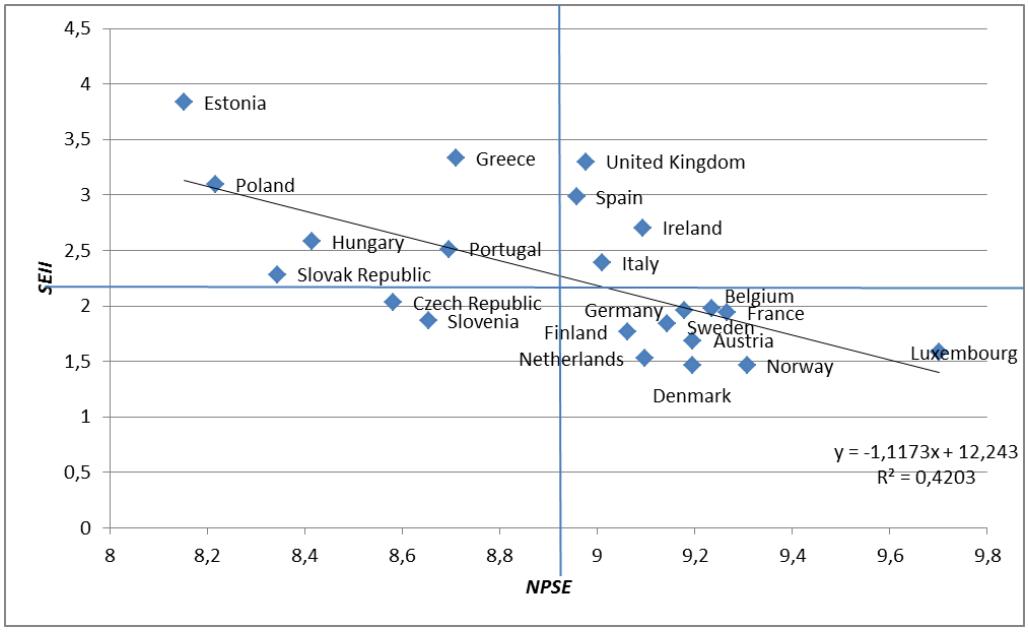
Table 2. ***The Social Expenditure Inefficiency Index*** **(2013)**

Country	SEII
Austria	1,688766
Belgium	1,978171
Czech Republic	2,032466
Denmark	1,467653
Estonia	3,838971
Finland	1,769576
France	1,943538
Germany	1,962848
Greece	3,330452
Hungary	2,578343
Ireland	2,705011
Italy	2,390322
Luxembourg	1,581171
Netherlands	1,53085
Norway	1,467002
Poland	3,093786
Portugal	2,511969
Slovak Republic	2,283473
Slovenia	1,869697
Spain	2,982955
Sweden	1,839119
United Kingdom	3,300212

The final values are characterized by a high degree of heterogeneity within the group of countries considered, ranging from 1.47 (Denmark) to 3.83 (Estonia). Based on this ranking, one can distinguish three groups of countries: the Nordic countries, with Luxembourg and Austria, with the lowest inefficiency indexes (between 1,47 and 1,83); the Continental countries, with inefficiency parameters between 1,84 and 2,28; the Mediterranean and Anglo-Saxon countries, with Poland, Hungary and Estonia, with fairly high inefficiency parameters (2,39-3,83).

Unlike the result for general public expenditure in Afonso *et al*. (2005, 2010), inefficiency in social expenditure is not positively related to the amount of spending, as shown in Figure 2.[24]

Figure 2. The *Social Expenditure Inefficiency Index* and *Net Public Social Expenditure* (2013)



Source: Our elaborations on OECD Data

Differently from Boeri (2002), Sapir (2005) and Caruana (2010), Ireland and the United Kingdom are at the same levels of inefficiency as the Mediterranean countries. As for the new Continental countries, differently from Caruana (2010), the Czech Republic and Slovenia do not outperform the Northern countries, ranking with the other Continental countries and the Slovak Republic (even if Slovenia is quite near to Sweden), while Hungary joins Poland at the levels of the Mediterranean countries. This difference, besides the different time period under consideration, stems from the different measure of

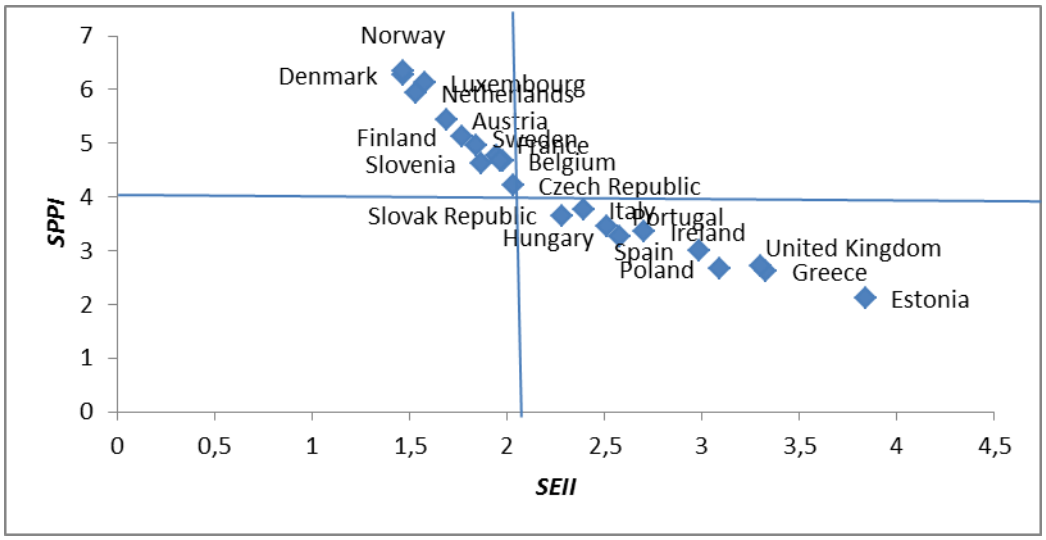
[24] The same applies to the relationship between the *SEII* and the ratio of net social expenditure to GDP.

performance that we adopt, based on the outcomes of a set of social policy areas that is wider than those adopted in the above-mentioned literature. [25] For instance, the lag of the Mediterranean countries w.r.t. the Anglo-Saxon ones in the area "unemployment" is compensated by a better performance in the fields of "health" (and "the elderly", as for the United Kingdom). Consequently, we believe that a general performance index can better assess the overall effect of social protection on social welfare.

As argued in section 2, a higher level of the inefficiency parameter α should be inversely related to $\beta\gamma$. This corresponds to an inverse relationship between the SPPI and the SEII. In the perspective of a cross-country comparison, we find that countries with an above average (2,14) inefficiency level have a below average (4,22) level of performance (Figure 3).

[25] Boeri (2002) and Sapir (2005) only consider the EU-15 countries and do not use an aggregate performance index, thus providing sectorial effectiveness analysis (labour market, poverty, redistribution, old age). Caruana (2010) compiles an aggregate outcome indicator using a Principal Component Analysis, considering five sectors (growth, poverty, inequality, labour market, unemployment).

Fig. 3 The relationship between the Social Protection Performance Index and the Social Expenditure Inefficiency Index



Source: Our elaborations on OECD Data

5. An efficiency analysis of social expenditure

Given the results of the previous sections, we now turn to the measure of the input and output efficiency of social expenditure, applying the method of the FHD analysis.[26]

The FHD analysis allows to construct a production possibility frontier, against which one can rank the individual countries' efficiency performances. In our framework, the performance achieved in the social sector (*SPPI*) is the output, while net social expenditure (*NPSE*) is the input. Countries on the frontier exhibit the highest possible level of performance, given the level of social expenditure (alternatively, they use the lowest level of expenditure to achieve a

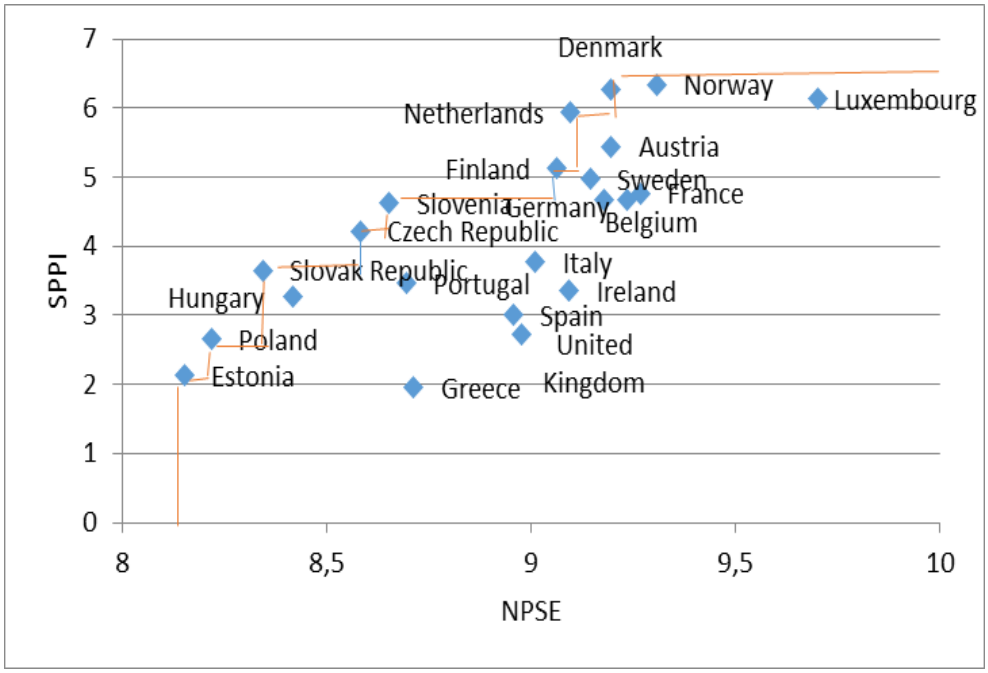
[26] The method was first developed by Deprins *et al.* (1984); for an application to general government expenditure, see Afonso *et al*. (2005). One limit of the method is that it does not statistically assess differences across countries.

given level of performance); in other words, there exist no other countries that obtain the same level of performance with a lower level of expenditure. Countries on the frontier are assigned input and output efficiency scores of 1; against them, one can measure the relative input and output inefficiency of countries that lie inside the frontier. In general, country A is inefficient relative to the frontier country B if it achieves a lower performance with a higher (or equal) expenditure; the output efficiency score of country A will be given by the ratio between its performance and that of country B, while its input efficiency score by the ratio between the level of expenditure of country B and its own expenditure level. Countries inside the frontier will thus have input and output efficiency scores that are smaller than 1. The input efficiency score shows how much less they could spend to obtain the same performance level; the output efficiency score how much higher their performance could be with the same amount of expenditure. Based on these scores, countries can be ranked according to their input and output efficiency levels (countries on the frontier being all ranked in the first place).

The production possibility frontiers for our set of countries in 2013 is presented in Figure 4. Czech Republic, Denmark, Estonia, Finland, Netherlands, Norway, Poland, Slovak Republic and Slovenia are on the frontier.[27]

[27] Note that countries on the frontier are efficient in a relative sense, since no other country obtains a higher performance with a lower expenditure level. This might underestimate inefficiencies. For instance, Estonia and Poland are on the frontier though having a relatively high inefficiency index.

Figure 4. Production possibility frontier (2013)



NPSE= per capita Net Social Public Expenditure (average value 2009-2013) (in ln)

Countries' efficiency scores and ranks are reported in Table 3.[28] For countries inside the frontier, input efficiency scores range between 0,51 and 0,92, while output efficiency scores between 0,57 and 0,97. The average input efficiency score is 0,85 (0,75 if one considers only countries inside the frontier): this means that the same performance could be obtained using 85% of actual expenditure. The average output efficiency score is 0,86 (0,77 for inefficient countries): this means that performance is 14% less than the level that could be reached using the actual amount of expenditure.

Countries with a below than average amount of per capita net public social expenditure are only slightly more efficient than those with an above average

[28] Input efficiency scores are computed based on the absolute values of net public social expenditure, PPP US dollars (average 2009-2013).

level (among inefficient countries, slightly less efficient). Thus, the inverse relationship between expenditure size and efficiency, found for general government expenditure (Afonso *et al*., 2005), does not seem to be confirmed for social expenditure.

Population size appears a more relevant factor in determining efficiency: countries with population above the mean (United Kingdom, France, Germany, Spain, Italy, Poland) exhibit, on average, an input efficiency score (0,78),[29] lower than smaller countries (0,87, on average). This might be a consequence of higher administrative costs - because of a lower population homogeneity, reduced flexibility of the institutional framework, higher information costs (Robinson, 1960) - associated to a larger number of beneficiaries, in a context where economies of scale are not particularly relevant.

[29] The average value is 0,74 if one only considers countries inside the frontier.

Table 3. Efficiency scores and ranks (2013)

Countries	**FDH**			
	input efficiency	Rank	output efficiency	Rank
Austria	0,90	4	0,87	4
Belgium	0,84	6	0,75	10
Czech Republic	1,00	1	1,00	1
Denmark	1,00	1	1,00	1
Estonia	1,00	1	1,00	1
Finland	1,00	1	1,00	1
France	0,81	7	0,76	8
Germany	0,89	5	0,79	7
Greece	0,57	12	0,42	14
Hungary	0,93	2	0,89	3
Ireland	0,47	14	0,66	11
Italy	0,65	13	0,81	6
Luxembourg	0,60	11	0,97	2
Netherlands	1,00	1	1,00	1
Norway	1,00	1	1,00	1
Poland	1,00	1	1,00	1
Portugal	0,70	10	0,75	9
Slovak Republic	1,00	1	1,00	1
Slovenia	1,00	1	1,00	1
Spain	0,54	8	0,65	12
Sweden	0,92	3	0,84	5
United Kingdom	0,53	9	0,59	13
Average				
All	0,83		0,85	
Per capita expenditure below mean	0,83		0,83	
Population above mean	0,74		0,77	
Inefficient countries				
All	0,72		0,77	
Per capita expenditure below mean	0,65		0,66	
Population above mean	0,68		0,72	

For countries inside the frontier, input efficiency scores range between 0,47 (Ireland) and 0,93 (Hungary), while output efficiency scores between 0,42 (Greece) and 0,97 (Luxembourg).

Looking at the traditional division of welfare systems, thus excluding post-communist countries, Nordic countries (Denmark, Finland, Netherlands,Norway) have an average input efficiency score of 0,98 and an average output efficiency score of 0,97; central countries (Austria, Belgium, France, Germany and Luxembourg) an average input efficiency score of 0,81 and an average output efficiency score of 0,83; Mediterranean counties (Greece, Italy, Portugal and Spain) 0,62 for input and 0,66 for output efficiency; Anglo-Saxon countries (Ireland and UK) 0,50 for input and 0,63 for output efficiency. Post-communist countries exhibit SEII greater than Nordic and Continental (except for Slovenia) countries; nevertheless, some of them (notably, the small ones) are placed on the frontier, thus obtaining efficiency scores of 1. This is not a contradiction, since they are efficient relatively to the Mediterranean and Anglo-Saxon countries.

As noted in section 4, the difference with the literature on the effectiveness and efficiency of European welfare policies stems from the composition of the performance index that we have proposed, based on the outcomes in all the main areas specific of social policy.

6. Conclusions

Our theoretical analysis of the relationship between social performance and efficiency predicts that the size of social protection increases with the median voter's income level and its proximity to the bottom end of the distribution and decreases as the inefficiency of social expenditures increases. These claims are supported by the data.

To test the model, we first constructed performance indexes for 22 European countries in 2013. While the literature on the effectiveness and the efficiency of welfare systems proposes sectorial analyses, we construct a composite performance index (*SPPI*) based on the outcomes of all main sectors of social policy. Then, we calculated an inefficiency index (*SEII*) as the ratio of net social expenditure to the performance index (existing studies use gross social expenditure); the efficiency analysis is completed by the construction of a production possibility frontier using the FHD method.

We obtain a ranking of countries not completely in line with those found in the literature: for instance, Mediterranean and Anglo-Saxon countries end up being quite similar. We also find that, in the field of social protection, efficiency does not appear to be inversely related to the size of public intervention. Population size and the type of welfare system appear to be more relevant factors in determining the effectiveness and efficiency of social expenditure.[30] These

[30] Of course, given the difficulties in cross-country data comparability and in separating the effect of public expenditure from that of other factors (just take life

findings can be of relevance within the debates on the optimal spatial dimension of welfare services (for a review see, among others, Ferrera, 2005; Kunzel, 2012) and the link between the characteristics of welfare systems and their efficacy and effectiveness, to which we have already referred in the paper: by comparing the performance and efficiency rankings, we found that countries with higher expenditure efficiency present a greater homogeneity of performance in all subsectors considered.

This might be related to the cross effects of sectorial policies, that thus tend to reinforce each other. For instance, a higher expenditure level in support of families, like childcare, encourages female participation in the labour market and can therefore contribute to reduce poverty and income inequality. As a policy implication, the paper suggests that expenditure policy should follow a multi-target approach, not devoting resources only to contrast some particular social risks, given that some sectorial policies can have indirect positive effects on other areas, thus guaranteeing a more efficient use of resources.

Appendix

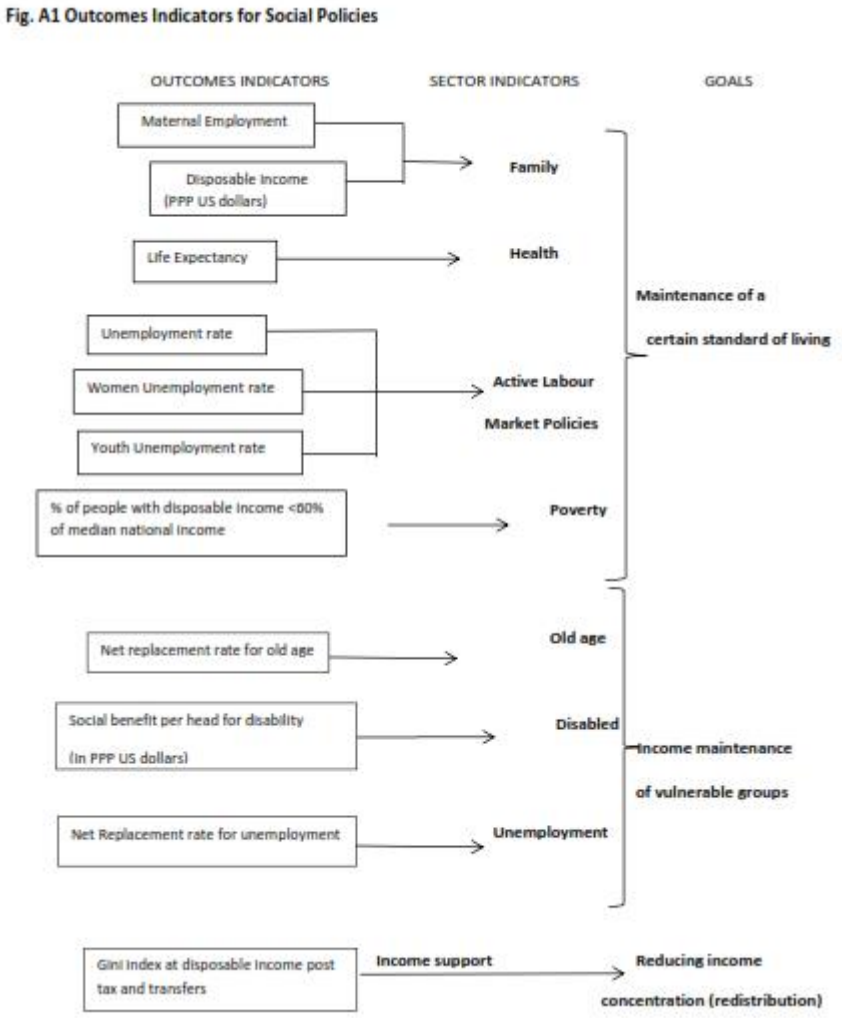
Methodological notes and data for outcomes indicators

This appendix provides some methodological notes on some outcomes' indicators used to calculate the performance index.

expectancy as an example), all the results are indicative. Also, the 22 countries have different levels of private social expenditure; these are limited in general, albeit higher in the Nordic countries.

In the paper, we consider 7 sectors of social expenditure (family, health, labour market, elderly, disabled, unemployment, inequality) and 8 sector indicators (we add poverty) for their related outcomes.

Fig. A1 Outcomes Indicators for Social Policies



In some cases, the outcomes' indicators are data (maternal employment, life expectancy, unemployment rate, Gini index, poverty index) directly available on OECD databases. In other cases, some elaboration was needed. For example, for family and disabled, we use monetary amounts considered net of

fiscal measures and expressed in PPP (US dollar) to make the international comparison possible. While for the disabled, we directly use the available Eurostat data on the monetary benefits that, on average, national governments allocate in the form of disability pensions or monetary transfers, for the family available income we simulated the net disposable income of a "typical" family – which we adopt as a benchmark – consisting of two children and two working parents with, respectively, a gross income from employment equal to 100 percent and 67 percent of the average income from employment in their country of residence. Net disposable income is calculated by subtracting the income tax (considering deductions or tax credits) and social contributions from gross taxable income (adjusted for deductions) and adding monetary benefits. For the simulation analysis, the OECD's tax-benefit calculator model (available at the following link: http://www.oecd.org/els/soc/benefitsandwagestax-benefitcalculator.htm) was used. The results of the simulation are in Tab. A1.

Tab. A1 Net Family Income (2013)

Countries	Net Family income in PPP (US dollars) 2013
Austria	64998,75
Belgium	62648,28
Czech Republic	32836,91
Denmark	58836,54
Estonia	30900,19
Finland	59222,34
France	57993,89
Germany	66490,35
Greece	49334,96
Hungary	29814,12
Ireland	60947,56
Italy	50506,70
Luxembourg	84729,00
Netherlands	71318,07
Norway	72517,29
Poland	29406,64
Portugal	39433,96
Slovak Republic	28512,05
Slovenia	37712,85
Spain	52286,35
Sweden	60947,32
United Kingdom	68063,40

Source: elaboration on OECD tax-benefit calculator data

Other income support policies target groups of individuals who exhibit a certain degree of vulnerability, due to life cycle and market risks, within the framework of the market economy: the elderly, the unemployed. For each of these categories, the benchmark indicator that we have identified is the average amount of available resources (therefore net of fiscal measures)[31] which the various national welfare systems guarantee to them. For the elderly, we have used the net replacement rate relating to compulsory pension schemes, which

[31] In all cases, we consider monetary benefits in net terms, i.e. net of fiscal measures (direct taxation, resulting from social transfers, indirect taxation of consumption by recipients of transfers and tax benefits for social welfare purposes).

represents the percentage of individual income, net of contributions and taxes, that the pension system guarantees after exiting the job market. Formally, this is the ratio of the net pension to the labour income net of tax. Three levels of labour income were considered: 50 percent, 100 percent and 150 percent of national average labour income (AW) (Tab. A2).

Tab. A2 Net Replacement Rate for Pensions (2013)

	Net Replacement Rate for pensions (2013)		
	Low earner (0,5 AW)	Average earner (AW)	High earner (1,5 AW)
Austria	91,2	90,2	86,2
Belgium	80,7	62,1	48,3
Czech Republic	97,8	63,8	50,8
Denmark	117,5	77,4	67,4
Estonia	79,7	62,4	55,5
Finland	71,3	62,8	63,2
France	75,9	71,4	60,9
Germany	55,2	57,1	56,1
Greece	92,5	70,5	65
Hungary	94,4	95,2	96,1
Ireland	75,5	44,8	34,6
Italy	83,9	81,5	83,3
Luxembourg	87,1	69,4	66,8
Netherlands	104,8	101,1	97,2
Norway	91,1	62,8	51,3
Poland	61,3	59,5	59,1
Portugal	77,7	67,8	68,4
Slovak Republic	88,1	85,4	84,7
Slovenia	63,5	63,3	60,6
Spain	79,5	80,1	79,8
Sweden	68,8	55,3	72,9
United Kingdom	67,2	41,8	30,5

Source: Pensions at a Glance, OECD Pensions Statistics (database)

From a methodological point of view, we repeat a simulation analysis to calculate the net replacement rate of unemployment benefits during the first year of unemployment, which represents the proportion of net labour income replaced by net benefits received in the event of unemployment.

The latter, in turn, depend on both labour income and the recipient's family situation. Therefore, two income categories were considered (67 percent and 100 percent of national average labour income) and, within each of them, six types of family: three typical families (single parent, single-earner households and families with both partners in employment) without children and three families of the same types with two underage children (Tab. A3 and Tab. A4). In both cases, we consider families which do not qualify for cash housing assistance or social assistance while working.

Table A3. Net replacement rates unemployed: case 1 (67% AW) (2013)

	67% of Average Wage (AW)					
	No children			2 children		
Countries	Single person	One-earner married couple	Two-earner married couple	Lone parents	One-earner married couple	Two-earner married couple
Austria	55	57	80	71	72	85
Belgium	90	83	84	95	82	85
Czech Republic	65	65	87	67	67	88
Denmark	84	85	92	89	87	92
Estonia	55	57	77	65	62	79
Finland	59	59	80	74	69	84
France	69	65	84	71	68	84
Germany	59	59	86	81	83	90
Greece	39	40	68	46	46	70
Hungary	68	68	84	76	76	87
Ireland	50	80	75	50	75	81
Italy	72	76	86	81	78	88
Luxembourg	83	81	90	90	89	93
Netherlands	76	77	84	67	81	77
Norway	68	69	84	79	73	86
Poland	49	50	75	80	56	76
Portugal	75	75	93	79	78	94
Slovak Republic	62	58	85	72	57	86
Slovenia	86	83	93	85	88	96
Spain	78	75	89	76	74	88
Sweden	63	63	81	71	67	83
United Kingdom	20	31	60	47	56	67

Source: OECD Benefits and wages statistics http://www.oecd.org/els/benefits-and-wages-statistics.htm

Table A4. Net replacement rates unemployed: case 1 (67% AW) (2013)

	100% of Average Wage (AW)					
	No children			2 children		
Countries	Single person	One-earner married couple	Two-earner married couple	Lone parents	One-earner married couple	Two-earner married couple
Austria	55	56	76	67	68	81
Belgium	67	63	71	74	64	74
Czech Republic	65	65	83	70	66	89
Denmark	58	60	75	67	64	76
Estonia	54	56	73	60	61	74
Finland	58	58	76	70	65	79
France	67	67	80	71	68	81
Germany	59	59	83	71	69	88
Greece	28	28	57	33	34	59
Hungary	45	45	67	57	56	72
Ireland	36	57	63	48	67	69
Italy	57	60	75	69	69	77
Luxembourg	85	82	88	93	89	92
Netherlands	75	77	83	68	81	78
Norway	65	66	79	76	69	81
Poland	33	35	60	53	41	62
Portugal	75	75	95	77	77	98
Slovak Republic	65	59	82	93	58	84
Slovenia	68	67	81	77	72	84
Spain	56	56	74	70	70	82
Sweden	44	44	67	53	48	68
United Kingdom	14	22	50	40	48	56

Source: OECD Benefits and wages statistics http://www.oecd.org/els/benefits-and-wages-statistics.htm.

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