The Contribution of Proportional Taxes and Tax-Free Cash Benefits to Income Redistribution over the Period 2005-2018: Evidence from Italy

by

*STEFANO BOSCOLO**

Abstract

During the last two decades a growing interest in understanding what determines the redistributive role of tax-benefit systems has been recorded worldwide. For the case of Italy, previous analyses were mainly focused on quantifying the contribution of marginal tax rates, deductions and tax credits to the redistributive capacity of PIT, neglecting the effect on income redistribution of proportional taxes and income sources exempt from taxation such as tax-free cash benefits. The following paper aims to fill this gap by applying two alternative Gini-based decomposition methodologies (Onrubia et al., 2014; Urban, 2014) to the Italian tax-benefit system's redistributive power over the period 2005-2018. The contribution of each tax-benefit instrument is quantified for several scenarios which diverge from each other for being representative of different degrees of extension of the tax-benefit system under study.

JEL: D3, H2

Keywords

tax-benefit system; progressive taxation; decomposition approach; redistribution; EUROMOD

Acknowledgments

The results presented here are based on EUROMOD version I1.0+. EUROMOD is maintained, developed and managed by the Institute for Social and Economic Research (ISER) at the University of Essex, in collaboration with national teams from the EU member states. I am indebted to the many people who have contributed to the development of EUROMOD. The process of extending and updating EUROMOD is financially supported by the European Union Programme for Employment and Social Innovation 'Easi' (2014-2020). The results and their interpretation are the author's responsibility. I also want to thank Ivica Urban and Alari Paulus for their useful suggestions.

---

* Ph.D. Student of the Marco Biagi Foundation – University of Modena and Reggio Emilia. Email: stefano.boscolo@unimore.it

1. Introduction

In recent years, the study of tax redistribution has been revived by the increasing availability of exhaustive and comparable data sets at the micro level. This richness of information offered has lead to remarkable advances in static microsimulation modelling (Orcutt, 1957; O'Donoughe, 2014). Besides the development of the state-of-the-art tax-benefit microsimulation model EUROMOD (Surtherland and Figari, 2013), whose cross-country comparability is the crucial strength, a variety of national models have indeed flourished all over the European countries.[1] A broader spectrum of questions concerning income inequality measurements can be now addressed by social scientists both in a spatial and temporal comparative perspective. In the context of this paper, microsimulation techniques provide the starting point for studying the effect of taxes and benefits on income redistribution.

When estimating the equalising effect of a tax-benefit system over different time periods, a distinction on the nature of the effects involved needs to be reminded. A lower or higher level of income inequality can be the result of policy changes in the tax-benefit system under study, as well as of changes not directly related to the structure of the tax-benefit system such as differences in market income distributions or demographic characteristics (Bargain and Callan, 2010). Following this framework, it is possible to isolate the contribution of overall policy changes on income inequality levels from all other effects over time. But what do we know about the role played by each tax-benefit instrument in shaping redistribution? What tools affect most redistribution when focusing merely on PIT? At a broader level, do proportional taxes and tax-free cash benefits play a progressive effect on income inequality?

Despite the lack of homogeneity with which they have been addressed in terms of methodological approaches employed, these questions have received a growing attention all over the world during the past two decades (Creedy and Van de Ven, 2002; Immervoll et al., 2005; Urban, 2008; Kristjánsson, 2011; Verbist and Figari, 2013; Hümbelin and Farys, 2018; Morger and Schaltegger, 2018; Guilland et al., 2019). As for Italy, whose tax-benefit system is the objective of this study, plenty of evidence have been provided above all on the relative effect of PIT components. One of the earliest contribution to the field was given by Wagstaff and Van Doorslaer (2001), showing that progressivity of both gross and net tax liabilities were mainly due to rate and tax credit effects at the tax unit level during the mid-late 1980s. Moving to more recent evidence and still keeping the individual as unit of analysis, the contribution

given by tax credits and marginal tax rates was quantified in 61.2% and 40.3% respectively of the net redistributive power of PIT by Di Caro (2018) using individual tax returns for the 2014 tax period, whilst deductions exercise a much smaller positive effect (1.3%). Similar results were obtained by Barbetta et al. (2018) analysing a sample of tax reports for the 2011 tax period and with studies based on sample survey data both at the individual and household level (Boscolo, 2019).

Taking a broader focus, Fuest et al. (2010) analysed the redistributive effect of tax-benefit systems in the enlarged EU by applying two decomposition approaches on the 2007 EU-SILC wave at the household level, namely the *sequential accounting approach* and the *factor source decomposition approach,* both implemented on the basis of the generalized entropy class of inequality indices (Shorrocks, 1980). Notably, the authors remark how the application of each method led to contradictory policy implications. Taking the Italian tax-benefit system, the former suggested a predominant effect of public pensions and PIT in determining redistribution (38.3% and 25.0% respectively), accompanied by a small equalizing effect of cash benefits (4.3%) and a negative impact of social insurance contributions (-3.0%); with the latter method, on the contrary to the just mentioned evidence, the redistributive role played by public pensions was found to be negative (-15.3%) and the same for cash benefits (-1.5%), while PIT and social insurance contributions showed an equalizing effect on income inequality (46.8% and 16.9% respectively). The discussed study, although its relevance in shedding light on the contribution of several tax-benefit instruments, was carried out by focusing on aggregate income variables such as the total sum of cash benefits rather than the total amount of public pensions granted.

To the best of our knowledge, no research has yet explored the contribution of proportional taxes and tax-free cash benefits to the redistributive effect of the Italian tax-benefit system at the single-measure level. The aim of this paper is to fill this gap by applying two alternative Gini-based decomposition methodologies recently proposed in the literature (Onrubia et al., 2014; Urban, 2014) on different degrees of extension of the tax-benefit system under study – referred as scenarios in what follows. Each scenario was simulated by using the EUROMOD microsimualtion model both for the 2005 and 2018 tax period. The temporal comparative perspective will allow us to show the differences in the redistributive power of each tax-benefit measure in light of the substantial legislative changes intervened in the time span chosen.

The study of how overall tax-benefit systems redistribute resources appears indeed to be of crucial relevance in the Italian context seen the recent changes occurred in the

tax treatment of self-employment income (MEF, 2019) and the declared intention of the government[2] to introduce through a stepwise process a flat tax scheme on personal income as ultimate goal of the tax policy agenda of the current Parliament term – the XVIII for the sake of precision (Baldini and Rizzo, 2019b). Proposals for such a reform in the Italian public debate share a likely common effect: an increase in income inequality associated with a simultaneous decrease in both progressivity and average tax rate effect, the lattter due to revenue losses that can reach up to 50 billion euros in the most radical reform proposal (Baldini and Rizzo, 2019a). Since 'the taxation system shall be based on criteria of progression' as stated by Article 53 of the Italian Constitution, the importance of understanding how progressive taxation is shaping the redistribution of the whole tax-benefit system acquires a renewed interest in light of a tax reform on personal income so far marked by negative redistributive consequences. On top of this, it is necessary to remind that VAT still remains highly regressive on bottom income groups (Gastaldi et al., 2017). At the same time, the ongoing process of gradual erosion of the PIT base through the subjection of some of its income components to proportional taxation (Boscolo, 2019), which has often been taken as one of the justifications for the introduction of a flat tax scheme due to the loss of vertical and horizontal equity (Stevanato, 2016; Rossi, 2018), offers an additional perspective of how the following research may be useful for the purposes of this debate.

The paper is structured as follows. Section 2 discusses the data and methodological approach, focusing above all on the scenarios simulated and on the decomposition formulas employed in order to determine the relative contribution of each tax-benefit instrument. Section 3 presents the results of the analysis. Finally, Section 4 concludes the paper.

2. Data and methodological approach

As previously mentioned, the analysis was carried out by using the EUROMOD model for both years considered. Data employed are the best-match data sets available for running the microsimulation model, namely the 2006 and 2016 European Union Statistics on Income and Living Condition (EU-SILC) for the simulation of the 2005 and 2018 tax period respectively. All scenarios discussed here were simulated by taking the household as unit of analysis, made equivalent by means of the OECD modified scale.

Table 1. Description of the scenarios simulated

VARIABLE	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Gross income subject to progressive taxation before SICs				✓
Gross income subject to progressive taxation after SICs	✓	✓	✓	
Gross income subject to proportional taxes		✓	✓	✓
Tax-free cash non-means- and means-tested benefits			✓	✓
Other income sources exempt from taxation			✓	✓

A brief summary of the extension of the scenarios involved is presented in Table 1. Starting from Scenario 1, its gross income definition is given by the sum of all gross income components subject to PIT and regional surtax. Results from this first scenario are of interest for two reasons: on one hand, given the availability of fully comparable studies based on administrative data (Barbetta, Pellegrino and Turati 2018; Di Caro 2018), they allow the macroeconomic validation of the model in terms of redistributive indices; on the other hand, substantial changes in the structure of PIT occurred during the period 2005-2018. Scenario 2 adds to the previous income definition all those income sources taxed at a proportional tax rate such as capital income and rental income from residential properties. The definition used in Scenario 3 adds to the sum of all income sources included in the previous two scenarios also income sources exempt from taxation, the latter being mainly made up of cash benefits regardless their non-means- or means-tested nature. And last but not least, Scenario 4 takes also into account social insurance contributions from whatever source (employee/self-employed as well as employer contributions).

2.1 Gini-based decomposition formulas

The decomposition formulas of the net/gross redistributive effect applied in this study are discussed below. The computation of the contribution given by each tax-benefit instrument is first carried out by applying the generalisation of the Pfähler–Lambert decomposition provided by Onrubia et al. (2014) (hereinafter O14). This method allows to associate to each tool available to the government a single effect on the gross redistributive capacity of the tax-benefit system as mesured by the Reynolds-Smolensky index (hereinafter RS index), overcoming the need of a sequential order when measuring the contribution of tax expenditures.

Following the order of the terms of the right-hand side in (1), the RS index can be broken down into three main aggregates, namely: i) the sum of tax schedules; ii) the

sum of tax credits; iii) the sum of exemptions, allowances and tax deductions. Each aggregate is given by the sum of its subcomponents, while the single subcomponent is given by the product of the group weight, constant for all subcomponents of a specific aggregate, the individual weight and the Kakwani index (hereinafter K index). Y is the gross income, that is the sum of all income sources either subject to or exempt from progressive taxation according to the scenario simulated; B is the total taxable income, given by the sum of taxable income components subject to PIT or substitute taxes; S stands for total gross liability; T is total net liability; S_i indicates the *i-th* tax schedule; C_i is the *i-th* tax credit; finally, D_i represents the *i-th* exemption, allowance or deduction of the tax system. The upper bar means that the variable is at its average value.

It is worth bearing in mind that tax-free cash benefits can be thought of as exemptions, an interpretation which is indeed strengthened by the fact that several non-means-tested benefits are currently subject to progressive marginal tax rates (e.g. unemployment benefits). To simplify matters, taking only the first term of the right-hand side, the group weight is given by the $\overline{B}/(\bar{Y} - \bar{S})$; the individual weight is the proportion between the *i-th* tax schedule and total taxable income; $C_{B,Y} - C_{B-S_i,Y}$ is the difference between the concentration indices of taxable income and taxable income minus the *i-th* tax schedule respectively, both sorted by non-decreasing values of gross income – what we earlier defined as Kakwani index. The same logic is then applied to the remaining terms in (1).

$$RS = \frac{\overline{B}}{\bar{Y} - \bar{S}} \sum_{i=1}^{l} \frac{\bar{S}_i}{\overline{B}} (C_{B,Y} - C_{B-S_i,Y}) - \frac{\bar{Y}}{\bar{Y} - \bar{T}} \sum_{i=1}^{m} \frac{\bar{C}_i}{\bar{Y}} (C_{Y-S,Y} - C_{Y-S-C_i,Y}) - \frac{\bar{Y}\bar{S}}{\overline{B}(\bar{Y} - \bar{S})} \sum_{i=1}^{n} \frac{\overline{D}_i}{\bar{Y}} (G_Y - C_{Y-D_i,Y}) \quad (1)$$

The method proposed by O14 has received considerable attention in the most recent Italian literature (Di Caro, 2017 and 2018; Barbetta et al., 2018; Boscolo, 2019). Its desirable characteristic of allowing the decomposition on the common tax base of overall gross income, namely the sum of all mutually exclusive tax bases of a tax system, reinforces policy implications that can be derived from its application.[3]

The decomposition formula presented in (1) is employed to break down the RS index, capturing the reduction in inequality due to monetary transfers from better-off to worse-off income groups – what is usually classified as the principle of vertical equity

according to the *prevalent* view in the literature (Lambert, 2002; Urban, 2014). Our interest is also extended to the horizontal effect as identified by the reranking term, R, in order to obtain a measure of the net redistributive effect of the tax-benefit system (hereinafter RE). Its computation is carried out by using the non-unique method of estimation proposed in Duclos (1993) (hereinafter D93), which allows to separate the part of the reranking effect due to net tax liabilities, R^T, from that due to tax-free income sources broadly defined (almost all cash benefits), R^{Ben}. In breaking down the reranking term, we assume that net tax liabilities come first than cash benefits. The reranking decomposition discussed in (2) is applied according to the scenario under study.

$$R = R^T + R^{Ben} = (C_{Y-T,Y-T-Ben} - C_{Y-T,Y}) + (G_{Y-T} - C_{Y-T,Y-T-Ben}) \quad (2)$$

A requirement which needs to be met if one wants to obtain a correct decomposition of the vertical effect as described in (1) is to define total taxable income or total gross income as the sum of mutually exclusive components. Why is this needed? Take the case of social security contributions (hereinafter SICs). These are levied on gross labour income, while gross labour income after SICs is subject to PIT. When employing the method in (1), a problem arises in defining the common tax base. In the Italian tax-benefit system, self-employed SICs are subtracted from gross labour income after SICs subject to PIT to obtain taxable income. This would lead to an unjustified reduction of the common tax base since self-employed SICs are first included into taxable income for being then subtracted from it. In other terms, the sum of the relative effects is equal to the redistributive effect of the corresponding tax system only if $Y = B + D$, according to the notation in (1). In order to satisfy this condition, a lower value of total taxable income than the actual one would be needed. Consequently, the results of the decomposition are likely to be biased by the remarkable amount of self-employed SICs granted in form of deduction, which is equal to 19.6 billion euros for the 2017 tax period according to aggregate tax returns. The lack of mutual exclusion between income sources would therefore distort the contribution of the tools analysed.

To overcome these issues, the decomposition method introduced by Urban (2014) (hereinafter U14) seems to be particularly useful. Being based on the earlier contributions of Kakwani (1984) and Lerman and Yitzhaki (1985), it offers a solid unique approach for studying the contribution of taxes and benefits to marginal changes in vertical and horizontal effects of a tax-benefit system. Its informative power

makes it an appealing tool for policymaking decision process, since it provides an empirical framework to isolate the determinants of marginal changes in the net redistributive effect of a tax-benefit system conditional on the actual redistributive capacity of the latter. Differently from the previous method, it does not require compliance with the mutual exclusion property. Imposing proportional changes in pre-tax/benefit income, total taxes and total benefits for all income units[4], a single value is computed for each tax-benefit instrument both for the change in the vertical and horizontal effect. Recalling the notation in (1)-(2), an extended formalization of the method is given below:

$$\delta RE \;=\; \delta V - \;\delta H \;=\; \left(\sum_{i=1}^{l}\delta V_{T_i} + \sum_{i=1}^{m}\delta V_{Ben_i}\right) \;-\; \left(\sum_{i=1}^{l}\delta H_{T_i} + \sum_{i=1}^{m}\delta H_{Ben_i}\right) \tag{3}$$

$$\sum_{i=1}^{l}\delta V_{T_i} = \sum_{i=1}^{l}\frac{\bar{T}_i}{\bar{Y}-\overline{Ben}}\frac{C_{T_i,Y-Ben}-C_{Y-T,Y-Ben}}{G_{Y-Ben}-C_{Y-T,Y-Ben}}\dot{V} \tag{4}$$

$$\sum_{i=1}^{m}\delta V_{Ben_i} = \sum_{i=1}^{m}\frac{\overline{Ben}_i}{\bar{Y}-\overline{Ben}}\frac{C_{Y-T,Y-Ben}-C_{Ben_i,Y-Ben}}{G_{Y-Ben}-C_{Y-T,Y-Ben}}\dot{V} \tag{5}$$

$$\sum_{i=1}^{l}\delta H_{T_i} = \sum_{i=1}^{l}\frac{\bar{T}_i}{\bar{Y}-\overline{Ben}}\frac{(C_{T_i,Y-Ben}-C_{T_i,Y-T})+(G_{Y-T}-C_{Y-T,Y-Ben})}{(G_{Y-Ben}-C_{Y-T,Y-Ben})-(C_{Y-Ben,Y-T}-G_{Y-T})}\dot{H} \tag{6}$$

$$\sum_{i=1}^{m}\delta H_{Ben_i} = \sum_{i=1}^{m}\frac{\overline{Ben}_i}{\bar{Y}-\overline{Ben}}\frac{(C_{Ben_i,Y-T}-C_{Ben_i,Y-Ben})-(G_{Y-T}-C_{Y-T,Y-Ben})}{(G_{Y-Ben}-C_{Y-T,Y-Ben})-(C_{Y-Ben,Y-T}-G_{Y-T})}\dot{H} \tag{7}$$

$$\begin{aligned}\dot{V} = -\frac{(\bar{Y}-\overline{Ben})(1+\beta)}{\bar{Y}-\bar{T}}(G_{Y-Ben}-C_{Y-T,Y-Ben}) = \\ = \frac{-\bar{T}(1+\beta)}{\bar{Y}-\bar{T}}(C_{T,Y-Ben}-C_{Y-T,Y-Ben}) + \frac{\overline{Ben}(1+\beta)}{\bar{Y}-\bar{T}}(C_{Ben,Y-Ben}-C_{Y-T,Y-Ben})\end{aligned} \tag{8}$$

$$\begin{aligned}\dot{H} = \frac{(\bar{Y}-\overline{Ben})(1+\beta)}{\bar{Y}-\bar{T}}(C_{Y-Ben,Y-T}-G_{Y-T}) - \frac{(\bar{Y}-\overline{Ben})(1+\beta)}{\bar{Y}-\bar{T}}(G_{Y-Ben}-C_{Y-T,Y-Ben}) \\ = \left[\frac{\bar{T}(1+\beta)}{\bar{Y}-\bar{T}}(C_{T,Y-Ben}-C_{Y-T,Y-Ben}) - \frac{-\bar{T}(1+\beta)}{\bar{Y}-\bar{T}}(C_{T,Y-T}-G_{Y-T})\right] \\ + \left[\frac{\overline{Ben}(1+\beta)}{\bar{Y}-\bar{T}}(C_{Ben,Y-Ben}-C_{Y-T,Y-Ben}) - \frac{\overline{Ben}(1+\beta)}{\bar{Y}-\bar{T}}(C_{Ben,Y-T}-G_{Y-T})\right]\end{aligned} \tag{9}$$

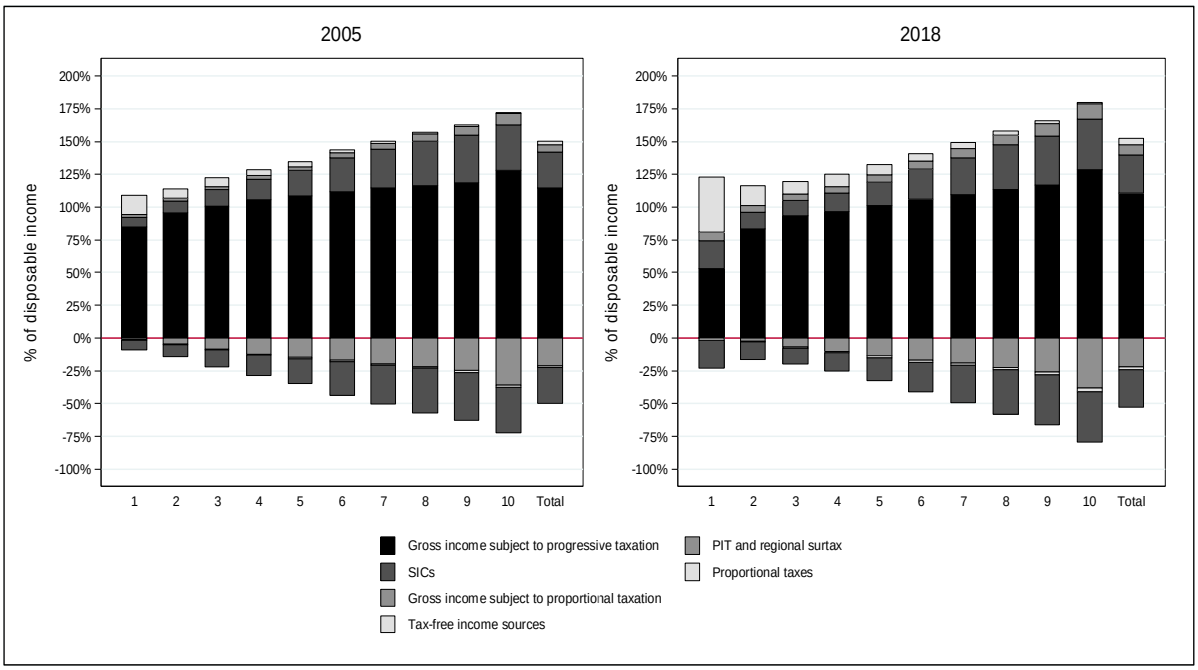
where δ indicates that we are now breaking down the change in vertical and horizontal effects; Ben_i is the *i-th* income source exempt from progressive taxation; $\boldsymbol{\beta}$ stands for the proportional change imposed and it is embedded within the methodology when an

upper dot lies above the terms. Consistently with O14, it is worth reminding that the decomposition formulas just presented rely on the *prevalent* normative view on vertical equity, which requires non-decreasing level of taxes minus benefits for non-decreasing values of pre-fiscal income in relative terms and not in absolute terms, as it is instead assumed by the alternative view (Urban 2014).

3. Data analysis

Before moving to the discussion of the application of the Gini-based decomposition approaches, it is worth presenting some general results concerning the temporal comparative analysis. This may be a useful exercise in order to better understand the context into which the analysis of the relative contribution of tax-benefit instruments takes place.

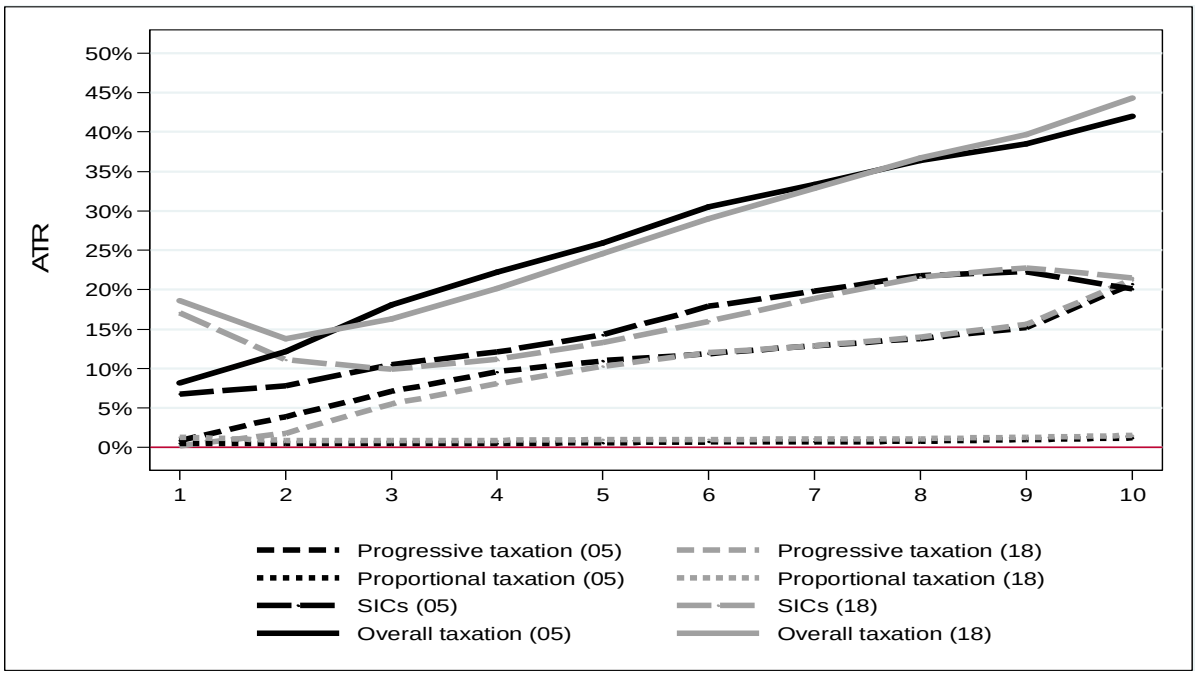
Figure 1. Income composition of household equavalised gross income by decile



One may be interested in knowing how income components which make up disposable income were distributed and what changes occurred over the period 2005-2018. Figure 1 seeks to find an answer by breaking down disposable income per decile of household equivalised gross income into six components based on the different tax regimes in force for both years. A greater weight on disposable income is now attributed to income sources exempt from any kind of tax duty, above all for the two poorest

income groups: their incidence almost tripled during the time span observed for the worse-off decile, increasing from 14.7% to 41.9%, while the second income group experienced a lower increase in relative terms since tax-free income sources doubled their influence moving from 7.2% to 15.1%. Despite its limited incidence on disposable income, the proportion of gross income subject to proportional taxes changed over the period studied from 5.4% to 8.0% when considering the whole population. By subtracting the overall amount of taxes and SICs from tax-free income sources along the income distribution, it is also possible to establish which income groups presented on average a positive net position, which can be thought of as the difference between what a household receives in forms of cash benefits and other tax-free income components minus total net liability. Only the poorest decile had a positive net position equal to 19.0% and 5.9% of disposable income in 2005 and 2018 respectively. The other groups along the income distribution presented a negative balance which generally becomes wider with increasing level of gross income. However, income groups for the 2018 tax period contributed in net terms more than in 2005 except for the ninth and tenth decile.

Figure 2. Average tax rate for the 2005 and 2018 tax periods by decile of household equivalised gross income under Scenario 4



Besides the slight changes in the income composition over the period 2005-2018, one may be also interested in understanding how total tax burdens varied among income

groups before moving on to the presentation of futher results. As shown in Figure 2, which takes again deciles of household equivalised gross income as the basis for the computation, the tax incidence curves of overall taxation in each tax period present a similar shape when moving upwards from the third decile. Tax burdens varied substantially in the left tail of the distribution over the period studied, where the increased incidence of SICs on total gross income for the poorest 20% in 2018 gives to the overall curve a V-shaped form. In addition, the lower incidence found for the 2018 year among the low-medium and medium income groups, which reached a peak of -2% in correspondence of the forth decile, is offset by the highest burden concentrated in the right tail of the distribution. The temporal comparison is therefore suggesting a further general result: the middle class seems to have benefited most from the changes occurred in the tax incidence curve over the period 2005-2018 at the expenses of the households located in the tails of the income distribution, which paid in relative terms a higher amount of taxes in 2018 compared to the 2005 tax period.

We are now ready to discuss the results of the application of the Gini-based decomposition approaches. Recalling the notation employed in Section 2, the net redistributive effect of a tax-benefit system can be divided into three components as follows (Reynolds and Smolensky, 1977):

$$RE = RS - R = \left[\frac{t}{1-t}(C_{T,Y} - G_Y)\right] - (G_{Y-T} - C_{Y-T,Y}) \tag{11}$$

where the first term between squared brackets, $t/1-t$, is the average tax rate effect related to the RS index, the latter capturing the redistributive effect of a tax-benefit system without taking account of horizontal adjustments along the income distribution; the second term in squared brackets is the K index and provides a measure of departure from proportionality of what is defined from time to time as total taxes according to the scenario under study; finally, the last term between round brackets stands for the reranking term, R. That being said, changes in the net redistributive effect can be driven by substantial increases (decreases) in the average tax rate keeping constant the level of progressivity achieved by the tax-benefit system and vice versa.

Table 2 reports the most used indices in measuring income redistribution for each scenario taking again the equivalent household as unit of analysis. First, it is crucial to stress the fact that pre-tax Gini indices (G_Y) under Scenario 1 diverge substantially over time. Gross income subject to PIT for the 2018 tax period, whose 66.4% was given by the sum of employment and self-employment income, is found to be less equally

distributed than its counterpart for the 2005 year: the gap in the Gini index is sharp and almost equal to 0.05 points. Despite this remarkable difference, when repeating the computation with a comprehensive definition of gross income as in Scenario 4, the 2018 tax-system still presents a higher level of income inequality but this is lower than in the former case. The gap is now 0.026 points both due to an increase of the 2005 pre-tax Gini index over the period of 2.5% and to a fall of 2.7% of the 2018 one.

Table 2. Redistributive indices under each scenario (indices multiplied by 100)

INDEX	**Scenario 1**		**Scenario 2**		**Scenario 3**		**Scenario 4**	
	2005	2018	2005	2018	2005	2018	2005	2018
G_Y: pre-tax Gini index	36.73	41.41	37.25	41.35	35.94	38.75	37.65	40.30
G_{Y-T}: post-tax Gini index	32.14	36.61	32.85	36.89	31.43	34.01	31.43	34.01
RE: net redistributive effect	4.60	4.81	4.40	4.47	4.51	4.74	6.22	6.30
$C_{T,Y}$: conc. index of taxes	57.04	61.00	56.40	59.32	56.19	58.98	51.55	53.85
K: Kakwani index	20.31	19.59	19.15	17.97	20.25	20.23	13.90	13.55
t: average tax rate	18.64	19.94	18.87	20.16	18.44	19.31	33.38	34.50
$t/(1-t)$: average tax rate effect	22.91	24.91	23.26	25.25	22.61	23.95	50.11	52.67
$C_{Y-T,Y}$: conc. index of net income	32.09	36.54	32.80	36.82	31.36	33.91	30.68	33.17
R: reranking or horizontal effect	0.05	0.07	0.05	0.07	0.07	0.10	0.75	0.84
RS: vertical effect	4.65	4.88	4.45	4.54	4.58	4.84	6.97	7.14
$GPit$: Gross income subject to PIT	100.0	100.0	95.5	93.3	93.1	89.3	76.2	72.5
$\%RS^{O14}$: PIT and surtax	101.3	101.5	100.9	96.2	93.1	80.1	-*	-*
$\%\delta V^{U13}$: PIT and surtax	100.0	100.0	94.8	94.4	73.4	61.5	43.2	40.2
$\%\delta RE^{U13}$: PIT and surtax	100.0	100.0	94.6	93.9	79.0	67.7	56.7	52.2

* No value is reported since the application of O14 for Scenario 4 would lead to biased results due to the lack of compliance with the mutual exclusion property as explained in Subsection 2.1.

Second, still on the comparison between the first and last of the simulated scenarios, the redistributive power of the tax-benefit system is higher of more than 30% in both years (ΔRE_{05}^{S1-S4}: 35.2% $\rightarrow$ ΔRE_{18}^{S1-S4}: 31.0%)[5]. As summarised by the post-tax Gini index (G_{Y-T}), inequality on disposable income is higher for the 2018 tax period consistently with previous findings on pre-tax income inequality. Looking at the determinats of RE, the degree of progressivity of PIT slightly declined over the time span chosen (K_{05}^{S1}: 0.2031 $\rightarrow$ K_{18}^{S1}: 0.1959), while the average tax rate increased by 1.3% (t_{05}^{S1}: 18.64% $\rightarrow$ t_{18}^{S1}: 19.94%). The higher value of RE_{18}^{S1} in absolute terms has to be therefore attributed to the predominance of the average tax rate effect over the progressivity effect. As expected, the average tax rate effect is still playing the key role

in determining the redistributive effect under Scenario 4 for both tax-benefit systems due to its remarkable increase (Δt_{05}^{S1-S4}: 79.1% $\rightarrow$ Δt_{18}^{S1-S4}: 73.0%), an effect partially offset by a decrease in the departure from proportionality (ΔK_{05}^{S1-S4}: -31.6% $\rightarrow$ ΔK_{18}^{S1-S4}: -30.8%) and by a growing importance of the reranking term (R_{05}^{S4}: 0.75 $\rightarrow$ R_{18}^{S4}: 0.84).

When broadening our interest to Scenario 2 and 3, it is first worth noting that progressivity diminishes as expected once including income sources subject to proportional taxation (ΔK_{05}^{S1-S2}: -5.7% $\rightarrow$ ΔK_{18}^{S1-S2}: -8.3%), for a decrease in the net redistributive effect ($\Delta RE_{05}^{S^1-S^2}$: -4.3% $\rightarrow$ ΔRE_{18}^{S1-S2}: -7.1%) which is not offset by the slightly increased average tax rate ($\Delta t_{05}^{S^1-S^2}$: 1.2% $\rightarrow$ Δt_{18}^{S1-S2}: 1.1%). Furthermore, SICs seem to play a crucial role in shaping the progressivity of the Italian tax-benefit system above all in 2005 since its level does not vary substantially from Scenario 1 to Scenario 3 ($\Delta K_{05}^{S^1-S^3}$: -0.3%). As far as the 2018 tax period is concerned, the more pronounced positive effect of income sources exempt from taxation on progressivity (ΔK_{05}^{S2-S3}: 5.7% $\rightarrow$ ΔK_{18}^{S2-S3}: 12.6%) seems to cointain the reduction of the latter under Scenario 4.

As we saw at the beginning, the ratio of gross income subject to PIT on total gross income (defined as *GPit* in Table 2) shows a decrease of 3.8% under Scenario 3 (3.7% under Scenario 4) over the period studied, which means that a higher fraction of income is now exempt from progressive taxation. But what seems even more interesting to stress is the consequent reduction in the contribution of progressive taxation to the redistributive effect depending on the decomposition approach employed. Supposing the absence of horizontal movements along the income distribution, the role of PIT and regional surtax jointly considered is quantified in 80.1% of RS_{18}^{S3} and 61.5% of δV_{18}^{S3} when employing O14 and U14 respectively. These contributions are both lower by more than 10% with respect to their counterparts for the 2005 tax period ($RS_{05}^{O14,S3}$: 93.1%; $\delta V_{05}^{U13,S3}$: 73.4%). The contribution of progressive taxation to marginal changes in RE, the latter being the sum of both vertical and horizontal changes, is then similarly reduced over the time period (δRE_{05}^{U13}: 79.0% $\rightarrow$ δRE_{18}^{U13} : 67.7%). When including SICs into the computation as in Scenario 4, the role of PIT and regional surtax is quantified in 40.2% of δV_{18}^{S4} and in 52.5% of δRE_{18}^{S4}, in both cases lower than the results for the 2005 tax period (δV_{05}^{S4}: 43.3%; δRE_{05}^{S4}: 56.7%). To state it clearly: progressive taxation as defined by the 2018 Italian tax-benefit system is now contributing less in relative terms than fifteen years ago to reducing income inequality according to the decomposition approaches employed in this study. Its reduced contribution to the

redistributive effect is not enough to say that progressive taxation does not make a difference in achieving redistributive goals since it still plays a substantial role regardless of the methodology chosen. However, the underlying message of the figures presented above is that progressive taxation would potentially contribute to a lower extent than its actual redistributive capacity (as computed by using O14) when enhancing redistribution via proportional changes for all income units. As a result, its reduced influence conditional on the existing composition of the tax-benefit system suggests that a relevant role in determining redistribution can also be pursued by other instruments different from progressive taxation.

3.1 The relative contribution of tax-benefit instruments applying Onrubia et al. (2014)

As mentioned at the beginning, progressive taxation went through major changes over the time span chosen. The most important change goes back to the introduction of the 2007 Finance Act, namely (Ceriani and Gigliarano, 2010): the 'no-tax-area and progressivity' allowance (D_1), graduated on the basis of the type of income earned, and tax allowances for dependent family members (D_2) were both replaced with a system of similar tax credits; the number of PIT brackets increased from four to five and the consequent change of the tax rate applied[6]. As a result, what determines the redistribution of PIT has remarkably changed. The relative role played by marginal tax rates amounted to 18.7% of RS for the 2005 tax-benefit system, obtained as the sum of gross PIT ($S^{S1}_{1,05}$: 21.1%) and the regional surtax ($S^{S1}_{2,05}$: -2.4%). What remains of RE was entirely achieved by deductions with a contribution of 83.7%, where the replaced deductions D_1 and D_2 accounted for 66.7% and 18.7% respectively. Tax credits conclude presenting a minor regressive effect of -1.1%. This distribution of effects was instead inverted for the 2018 tax-benefit system. Deductions lost their dominant role following the legislative changes: their effect is quantified in 4.2% of the gross redistributive effect. The greatest role is now given by tax credits with a contribution of 55.0% splitted between the tax credit which replaced the 'no-tax-area and progressivity' allowance ($C^{S1}_{5,18}$: 40.5%) and the pool of tax credits which replaced tax allowances for dependent family members ($C^{S1}_{6,18}$: 8.4%; $C^{S1}_{7,18}$: 2.9%; $C^{S1}_{9,18}$: 0.2%). Last but non least, PIT tax rates doubled their impact in relative terms on redistribution to 39.3%, followed by a smaller progressive effect of the regional surtax ($S^{S1}_{2,18}$: 3.2%)[7]. These findings show that tax expenditures for income source either in

the form of deductions (D_1) or tax credits (C_5) are still the tool which most determines PIT redistribution, a result which reflects the high ratio of taxpayers with prevailing employment or retirement income (83.3% in 2017, the most recent available year at the moment of writing)[8]. Relatives contributions calculated for the 2018 year are in line with previous investigations using administrative data (Barbetta et al., 2018; Di Caro, 2018).

Focusing on the results under Scenario 3 (full results of are reported in Appendix A), it can be seen that almost no tax-benefit instrument exercises a regressive effect on income distribution except for the proportional tax on deposits (S_8) for both tax periods. Withholding taxes on capital income and gains, the latter broadly defined as the sum of arrears and severance pay (S_3), government bonds (S_6) and others (S_4), dividends (S_5), private pensions (S_7) and deposits, contribute positively but to a small extent to determine RE, which is equal to 0.4% and 1.9% for the 2005 and 2018 tax period respectively. A growing and significant role is instead played by disability pensions[9] ($D^{S3}_{10,05}$: 2.0% $\rightarrow$ $D^{S3}_{10,18}$: 5.5%) and social pension ($D^{S3}_{8,05}$: 3.3% $\rightarrow$ $D^{S3}_{8,18}$: 4.9%). Family allowances, known in the Italian context as *Assegno per il nucleo familiare*, have a stable positive effect over the period studied ($D^{S3}_{9,05}$: 2.8% $\rightarrow$ $D^{S3}_{9,18}$: 2.9%).

A few new tax-benefit instruments were introduced over the period 2005-2018. Rental income from residential property is now excluded from the PIT base and taxed at a proportional tax rate of 10% when the underlying contract was stipulated at a controlled rent and 21% for all remaining cases. This optional tax regime, introduced under the name of *cedolare secca* in 2011, is meant to recover tax revenue and to favour the emersion of undeclared properties. After the first year of its introduction, revenue collected amounted to 0.9 billion euros for a total number of taxpayers of nearly half a million according to tax returns. The popularity of the alternative measure to progressive taxation increased rapidly in subsequent years, reaching an amount of revenue equal to 2.6 billion spreaded among 2.4 million taxpayers for the 2017 tax period. It is still unclear whether the exclusion from PIT of this income source has effectively helped in declaring unregistered immovable properties and consequently increasing revenue. This is because of another tax change which concerned rental income still subject by choice of the taxpayer to progressive marginal tax rates: while taxable income was determined taking the 85% of the rent's value till 2013, the ratio is now 95% (Beraldo and Esposito, 2019). Due to the high concentration in the wealthiest income groups ($C^{18}_{S9,Y}$: 0.56), the effect of *cedolare secca* on income inequality is found to be positive and equal to 2.9%.

Table 3. RE decomposition under Scenario 3 applying O14 (unit of analysis: equivalent household): brief summary of results

TAX-BENEFIT INSTRUMENT	**2005** **%RE**	**2018** **%RE**
PIT (S_1)	95.3	77.6
Regional surtax (S_2)	-2.2	2.5
Proportional taxes on capital income (S_3-S_8)	0.4	1.9
Proportional tax on rental income (S_9)	-	2.9
Social pension (D_8)	3.3	4.8
Family allowances (D_9)	2.9	2.9
Disability pensions (D_{10})	2.0	5.5
Housing benefits (D_{11})	0.2	0.2
Minimum Insertion Income (D_{12})	0.2	0.2
Child benefits (D_{13})	0.0	0.2
Maternity payments (D_{14})	0.0	0.2
Scholarships and grants (D_{15})	0.0	0.0
Non-taxable rental income (D_{16})	-0.4	0.0
REI (D_{17})	-	1.3
80 euro bonus (D_{18})	-	1.3
New Born bonus (D_{19})	-	0.6
Mother bonus (D_{20})	-	0.0
Reranking (R)	1.6	2.1
Redistributive effect (*RE*)	**100.0**	**100.0**

Note: values are ordered by increasing contributions of the 2005 tax period.

During the XVII Parliament term of the Italian Republic – distinguished by the government's action of the *Renzi Cabinet* – four measures were introduced in the broad context of redistributive policies: *a*) the '80 euro' bonus (D_{18})[10], an in-work refundable tax credit of 80 euros per month granted to employees with employment income ranging between 8,174 and 26,600 euros and positive net PIT, meant to stimulate private consumption of the working class and so boost economic growth (Baldini et al., 2015b; Bazzoli et al., 2017); its total amount was equal to 11.7 billion euros for 9.5 million earners according to administrative data for the 2017; *b*) the New Born bonus (D_{19}), a means-tested benefit of 960 euros per year aiming to tackle child poverty and to increase the purchasing power of medium-low income groups; it can be claimed by

households for each newborn child or adopted during the tax period in question if the corresponding ISEE (*Indicatore della Situazione Economica Equivalente*, a means testing criterion which also takes account of the overall wealth of the household, the latter made equivalent) is lower than 25,000 euros, while the amount of the bonus is doubled if ISEE is less than 7,000 euros; calculations EUROMOD for the 2018 tax-benefit system indicate that roughly 900 thousand households benefited from the bonus for a total amount of 1.1 billion euros; *c*) the Italian Minimum Income benefit for the 2018 year, better known as REI – *Reddito di Inclusione* (D_{17}), the first universal tool to fight absolute poverty ever introduced in the history of the Italian welfare state (Baldini et al., 2018), consisted of a cash benefit of maximum 6,408 euros per year conditioned on the fulfillment of several economic criteria and the activation of a personalised path of social and labour re-inclusion of the member's family[10]; based on EUROMOD, its aggregate value is quantified in 1.1 billion euros for a total number of households of 800 thousands; last, *d*) the Mother bonus (D_{20}), a lump sum benefit of 800 euros paid for the birth or adoption of a child regardless of the economic condition of the applicant; nearly half a million households received the measure in 2018 for an aggregate value of 485 million euros. These redistributive policies amounted to 14.4 billion euros in total, which is equal to 0.8% of GDP at market prices in 2018. The employment of O14 quantifies the gross redistributive effect of all four measures in 3.2%, showing a progressive effect for each policy except for the Mother bonus which has a neutral effect on inequality (D_{20}^{S3}: 0%). Particularly interesting appears the case of the '80 euro' bonus once compared to REI: both measures affect positively income redistribution with the same value of 1.3%. One may argue that an 11.7-billion-euro macroeconomic shock should lead to higher redistributive effects than an 1.1-billion-euro policy such as REI, even if the latter is thought to be targeted to the poorest income groups. The difference in cost is remarkable, and the same size of the effects may be interpreted as the incapacity of the '80 euro' policy to achieve an adequate level of redistribution seen its premises. The picture is then completed by the New Born bonus whose redistributive effect is equal to 0.6%.

So far the discussion has been centred on the contribution of tax-benefit instruments to the gross redistributive effect. In fact, O14 presents the characteristic of being an incomplete decomposition method focusing on vertical effects, which means that it does not provide a single value representing horizontal movements along the income distribution for each instrument analysed. The results of the application of D93 are therefore presented in what follows (see Appendix). What seems interesting to note are

the different magnitudes in the relative effect of net tax liabilities (R^T) and income sources exempt from progressive taxation (R^{Ben}) when moving from Scenario 3 to 4. The reranking of households under Scenario 3 after subtracting the total amount of net taxes from gross income minus tax-free income sources ($Y - Ben$, following the notation in Section 2), is such to have a positive effect on income inequality, but its magnitude varies substantially according to the tax-benefit system chosen ($R_{05}^{T,S3}$: -5.1% $\rightarrow$ $R_{18}^{T,S3}$: -4.8%). However, this equalising effect is not confirmed when including SICs for the 2005 tax-benefit system, where net tax liabilities contribute to reducing income redistribution ($R_{05}^{T,S4}$: 7.2%). The subsequent step consists of calculating the reranking of households after adding up tax-free income sources to gross income after taxes minus tax-free income sources, precisely disposable income, $Y - T$. Results show that R^{Ben} plays an offsetting role, being positive and always higher than R^T except for the 2005 tax-benefit system under Scenario 4, where it contributes to a lesser extent to the reduction of the net redistributive effect ($R_{05}^{Ben,S4}$: 4.9%).

3.2 The relative contribution of tax-benefit instruments applying Urban (2014)

To complete our investigation on the role of tax-benefit instruments in determining income redistribution, the results of the application of U14 will be discussed in what follows (see Appendix for full results). The peculiarity of this last exercise is twofold. First, the breaking down of RE was carried out taking account of SICs (Scenario 4). Second, the decomposition approach employed differs from O14 by calculating contributions to marginal changes in RE through small proportional increases in the overall value of taxes, benefits and pre-tax/benefit income for all units, therefore allowing us to isolate not just vertical but also horizontal effects of taxes and benefits.

The comparison of results among tax-benefit systems under Scenario 4 is given in Table 3. The contribution of overall SICs is quantified in 28.3% and 22.8% for the 2005 and 2018 tax period respectively. This means that SICs contributed nearly as much as half of the role played by progressive taxation in shaping redistribution, even if its influence decreased over the time period[10]. Much of the effect is achieved through employer's contributions ($S_{10,05}$: 17.8% $\rightarrow$ $S_{10,18}$: 15.1%), followed in order of magnitude by employee's ($S_{11,05}$: 6.0% $\rightarrow$ $S_{11,18}$: 5.9%) and self-employed's contributions ($S_{12,05}$: 4.5% $\rightarrow$ $S_{12,18}$: 1.8%). The only relevant difference over the period studied is therefore recorded for the latter. Despite the general increase in SICs, their

aggregate value is lower by 3.6 billion euros in 2018 than in the base tax period (as it is their incidence on total SICs) and no significant change in their concentration along the income distribution occurred ($C^{05}_{S12,Y}$: 0.50 $\rightarrow$ $C^{18}_{S12,Y}$: 0.53). It is also worth noting that employer and employee SICs' horizontal effects are such to halve their contributions to the net redistributive effect for both tax periods.

Table 4. Relative contribution of tax-benefit instruments under Scenario 4 applying U14: brief summary of results

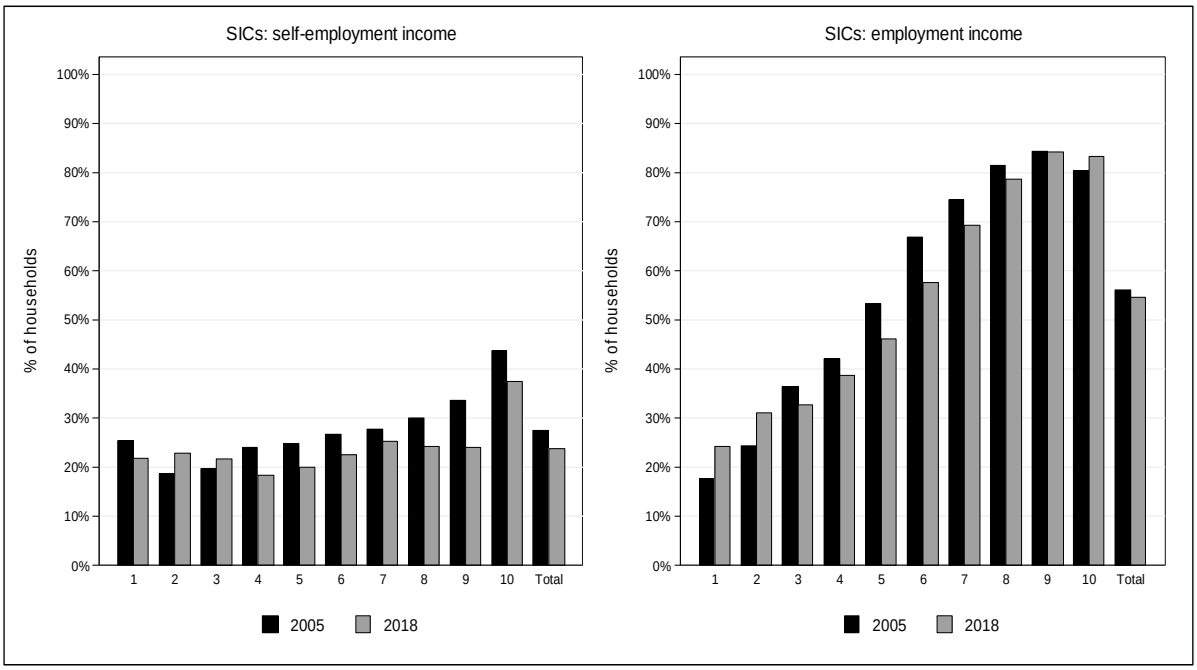
TAX-BENEFIT INSTRUMENT	**2005** **%RE**	**2018** **%RE**
PIT (S_1)	55.4	50.2
SICs: employer (S_{10})	17.8	15.1
SICs: employee (S_{11})	6.0	5.9
SICs: self-employed (S_{12})	4.5	1.8
Proportional taxes on capital income (S_3-S_8)	3.1	1.5
Regional surtax (S_2)	1.3	2.0
Proportional tax on rental income (S_9)	-	2.0
Social pension (D_8)	5.7	7.0
Family allowances (D_9)	5.0	4.2
Disability pension (D_{10})	2.1	5.2
Minimum Insertion Income (D_{12})	0.2	0.2
Housing benefits (D_{11})	0.2	0.3
Child benefit (D_{13})	0.1	0.3
Maternity payment (D_{14})	-0.1	0.3
Scholarships and grants (D_{15})	-0.2	-0.3
Non-taxable rental income (D_{16})	-1.1	0.0
REI (D_{17})	-	1.9
80 euro bonus (D_{18})	-	1.4
New Born bonus (D_{19})	-	0.8
Mother bonus (D_{20})	-	0.1
Redistributive effect (δRE)	**100.0**	**100.0**

Note: values are ordered by increasing contributions of the 2005 tax period.

The role of SICs in exercising an equalising effect on income redistribution can also be seen in Figure 3, where the percentage ratio of households where at least one member pays SICs by decile of household equivalised gross income is plotted. The incidence of SICs increasing with income is more evident for employer/employee's contributions

rather than self-employed contributions. Generally speaking, this 'natural' feature of proportional taxes levied on income sources highly concentrated on wealthy groups – such as capital income and gains and rental income from residential property – is playing a role in sharpening the loss of vertical equity associated with the exclusion of these income components from progressive taxation as it is in the Italian context (Boscolo, 2019).

Figure 3. Households with at least one member paying SICs by decile of household equivalised gross income



The application of U14 leads to results in line with O14 in terms of sign, magnitude and dynamics over time of redistributive effects. Most of the instruments analysed are found to have small horizontal effects, leaving thus up to vertical effects the determination of the net redistributive effect achieved. Disability pensions is the only tax-free cash benefits with relevant horizontal effects: in absence of the latter, their effect on redistribution would be almost doubled ($D_{10,05}$: 2.1% $\rightarrow$ $D_{10,18}$: 5.2%). Family allowances and social pension are confirmed to be among the cash benefits with the highest contribution to the net redistributive effect ($D_{8,05}$: 5.7% $\rightarrow$ $D_{8,05}$: 7.0%; $D_{9,05}$: 5.0% $\rightarrow D_{9,05}$: 4.2%). This is followed by various cash benefits with minor effects such as maternity payments (D_{14}), child benefits (D_{11}), housing benefits (D_{13}) and the minimum insertion income (D_{12}), called *Reddito minimo di inserimento*, whose aim is to tackle poverty and social exclusion. The sum of the effects of these residual cash

benefits amounts to 0.4% of δRE in 2005 and reaches 1.1% in 2018. The 'bonuses policy' is quantified in 4.2% of δRE, but differently from the previous applications, REI has an even higher progressive effect than the '80 euro' bonus ($D_{17,05}$: 1.9%; $D_{18,05}$: 1.4%). Withholding taxes on capital income are found to have a minor progressive effects also when employing U14, equal to 3.1% and 1.5% for the 2005 and 2018 tax-benefit system respectively. The proportional tax levied on rental income from residential property presents a positive effect in line with the previous applications ($S_{9,05}$: 2.0%). To complete our analysis, scholarships and grants negatively determine redistribution for both tax periods ($D_{15,05}$: -0.2% $\rightarrow$ $D_{15,18}$: -0.3%).

4. Conclusions

This article provides first evidence on the contribution of proportional taxes and tax-free cash benefits to income redistribution in Italy over the period 2005-2018. In order to answer the questions posed above, two alternative methods for decomposing the redistributive effect of a tax-benefit system were employed (Onrubia et al., 2014; Urban, 2014). The calculation of the effect of taxes and benefits was repeated for several scenarios which diverge from each other for being representative of different degrees of extension of the tax-benefit system under study. The main results of the study can be summarised as follows. The contribution of PIT components varied substantially over time. Marginal tax rates, deductions and tax credits determine PIT redistribution in the measure of 42.4%, 55.0% and 4.2% respectively, while the 2005 tax period presented an opposite distribution of effects (18.7%, -1.1% and 83.7%). In a more comprehensive scenario, which also includes gross income subject to proportional taxes and tax-free income sources such as cash benefits but excludes SICs, the role of PIT and regional surtax jointly considered to income redistribution is quantified in 80.1% for the 2018 tax period when employing Onrubia et al. (2014) – O14 for simplicity. Moving on to the contribution of the remaining tax-benefit instruments, withholding taxes on capital income are found to have a small progressive effect on income redistribution ranging between 0.4% and 1.9% over the period 2005-2018. Social pension, family allowances and disability pensions are the tax-free cash benefits which most contribute to determining redistribution in 2018 (2005): they amount to 4.8%, 2.9% and 5.5% (3.3%, 2.9%, and 2.0%) of the net redistributive effect respectively. To complete the picture in 2018, the proportional tax levied on rental income from residential properties, the so-called *cedolare secca*, presents a contribution of 2.9% as calculated with O14,

followed by the Italian minimum income benefit in force until March 2019 – known as REI – with an effect of 1.3% and by the '80 euro' bonus, also equal to 1.3%.

Finally, to overcome the lack of compliance with the mutual exclusion property and to take account of SICs into the analysis, the empirical strategy here proposed is to turn our focus on the contribution of taxes and benefits to marginal changes in vertical and horizontal effects, that is the application of the methodology proposed by Urban (2014). With this latter approach, the contribution of progressive taxation in 2018 is equal to 52.2% (63.7%) when including (excluding) SICs. In other words, progressive taxation contributes to a lower extent to marginal changes in the net redistributive capacity of the tax-benefit system than its actual contribution to income redistribution as earlier discussed. As far as proportional taxes and benefits are concerned, their contributions are found to be generally in line with the results of O14. It is worthwhile to mention that SICs have altogether a strong positive effect on income redistribution equal to 22.8% (28.3%) in 2018 (2005), driven mainly by SICs paid on employment income with a contribution of 21.0% (23.8%).

Appendix

RE decomposition applying O14 for the 2005 tax period (unit of analysis: equivalent household): full results

TAX-BENEFIT INSTRUMENT	Scenario 1			Scenario 2			Scenario 3		
	RE	%	$C_{X,Y}$	**RE**	%	$C_{X,Y}$	**RE**	%	$C_{X,Y}$
Tax schedules (*S*)	**.0086**	**18.7**	**.5619**	**.0080**	**18.2**	**.5561**	**.0078**	**17.3**	**.5539**
PIT (S_1)	.0097	**21.1**	.5685	.0088	**20.0**	.5634	.0086	**19.1**	.5610
Regional surtax (S_2)	-.0011	**-2.4**	.4317	-.0011	**-2.5**	.4280	-.0010	**-2.2**	.4251
Arrears and severance pay (S_3)				.0003	**0.7**	.5635	.0003	**0.7**	.5618
Other bonds (S_4)				.0001	**0.2**	.7119	.0001	**0.2**	.7119
Dividends (S_5)				.0001	**0.2**	.7317	.0001	**0.2**	.7297
Government bonds (S_6)				.0000	**0.0**	.6403	.0000	**0.0**	.6392
Private pensions (S_7)				.0000	**0.0**	.8708	.0000	**0.0**	.8672
Deposits (S_8)				-.0003	**-0.7**	.4317	-.0003	**-0.7**	.4333
Tax credits (*C*)	**-.0005**	**-1.1**	**.3733**	**-.0004**	**-0.9**	**.3698**	**-.0005**	**-1.1**	**.3660**
Minimum limits for PIT (C_1)	.0000	**0.0**	-.5789	.0000	**0.0**	-.5793	.0000	**0.0**	-.5731
Mortgage interest payments (C_2)	.0000	**0.0**	.3484	.0000	**0.0**	.3446	.0000	**0.0**	.3357
Building and refurbishing costs (C_3)	-.0001	**-0.2**	.3491	.0000	**0.0**	.3483	-.0001	**-0.2**	.3464
Other expenses (C_4)	-.0004	**-0.9**	.3880	-.0004	**-0.9**	.3838	-.0004	**-0.9**	.3807
Deductions and exemptions (*D*)	.0385	**83.7**	-.0351	**.0370**	**84.1**	**-.0345**	**.0385**	**85.4**	**-.0416**
PIT: income source (D_1)	.0307	**66.7**	-.0835	.0294	**66.8**	-.0826	.0277	**61.4**	-.0820
PIT: dependent family members (D_2)	.0086	**18.7**	-.2483	.0082	**18.6**	-.2412	.0078	**17.3**	-.2417
PIT: main residence (D_3)	.0004	**0.9**	.2421	.0004	**0.9**	.2408	.0004	**0.9**	.2383
PIT: other expenses (D_4)	.0000	**0.0**	.4220	.0000	**0.0**	.4183	.0000	**0.0**	.4159
PIT: private pension contribution (D_5)	-.0001	**-0.2**	.5786	-.0001	**-0.2**	.5739	-.0001	**-0.2**	.5692
PIT: maintenance payments (D_6)	-.0002	**-0.4**	.6108	-.0001	**-0.2**	.6108	-.0001	**-0.2**	.6031
PIT: self-employed SICs (D_7)	-.0009	**-2.0**	.4711	-.0007	**-1.6**	.4610	-.0008	**-1.8**	.4521
Social pension (D_8)							.0015	**3.3**	-.6624
Family allowances (D_9)							.0013	**2.9**	-.5073
Disability pension (D_{10})							.0009	**2.0**	.0533
Housing benefits (D_{11})							.0001	**0.2**	-.0836
Minimum Insertion Income (D_{12})							.0001	**0.2**	-.0142
Child benefit (D_{13})							.0000	**0.0**	-.6095
Maternity payment (D_{14})							.0000	**0.0**	.3154
Scholarships and grants (D_{15})							.0000	**0.0**	.3928
Non-taxable rental income (D_{16})							-.0002	**-0.4**	.6539
Reranking (*R*)	**.0005**	**1.1**		**.0005**	**1.1**		**.0007**	**1.6**	
Redistributive effect (*RE*)	**.0460**	**100.0**		**.0440**	**100.0**		**.0451**	**100.0**	
Pre-tax Gini index (G_Y)	.3673			.3725			.3594		
Post-tax Gini index (G_{Y-T})	.3214			.3285			.3143		

Reranking decomposition applying D13

2005 tax-benefit system	**Scenario 1**		**Scenario 2**		**Scenario 3**		**Scenario 4**	
	RE	**%**	**RE**	**%**	**RE**	**%**	**RE**	**%**
Taxes (R^T)	.0005	**1.1**	.0005	**1.1**	-.0023	**-5.1**	.0045	**7.2**
Benefits (R^{Ben})					.0030	**6.7**	.0030	**4.9**
Reranking (*R*)	**.0005**	**1.1**	**.0005**	**1.1**	**.0007**	**1.6**	**.0075**	**12.1**
2018 tax-benefit system	**Scenario 1**		**Scenario 2**		**Scenario 3**		**Scenario 4**	
	RE	**%**	**RE**	**%**	**RE**	**%**	**RE**	**%**
Taxes (R^T)	.0007	**1.5**	.0007	**1.6**	-.0048	**-4.8**	-.0019	**-1.9**
Benefits (R^{Ben})					.0058	**5.8**	.0103	**10.3**
Reranking (*R*)	**.0007**	**1.5**	**.0007**	**1.6**	**.0010**	**2.1**	**.0084**	**8.4**

RE decomposition applying O14 for the 2018 tax period (unit of analysis: equivalent household): full results

TAX-BENEFIT INSTRUMENT	Scenario 1			Scenario 2			Scenario 3		
	RE	**%**	$C_{X,Y}$	**RE**	**%**	$C_{X,Y}$	**RE**	**%**	$C_{X,Y}$
Tax schedules (*S*)	**.0204**	**42.4**	**.4743**	**.0183**	**41.0**	**.4683**	**.0173**	**36.4**	**.4652**
PIT (S_1)	.0189	**39.3**	.4730	.0147	**32.8**	.4630	.0138	**29.1**	.4600
Regional surtax (S_2)	.0015	**3.2**	.4981	.0012	**2.7**	.4867	.0012	**2.5**	.4839
Proportional tax on rental income (S_9)				.0015	**3.4**	.5709	.0014	**2.9**	.5640
Arrears and severance pay (S_3)				.0010	**2.3**	.5445	.0010	**2.1**	.5447
Private pensions (S_7)				.0000	**0.0**	.2268	.0000	**0.0**	.1918
Government bonds (S_6)				.0000	**0.0**	.4377	.0000	**0.0**	.4334
Dividends (S_5)				.0000	**0.0**	.4484	.0000	**0.0**	.4411
Other bonds (S_4)				.0000	**0.0**	.4906	.0000	**0.0**	.4848
Deposits (S_8)				-.0001	**-0.2**	.3342	-.0001	**-0.2**	.3322
Tax credits (*C*)	**.0264**	**55.0**	**.0873**	**.0253**	**56.6**	**.0822**	**.0214**	**45.1**	**.0805**
Income source (C_5)	.0195	**40.5**	.0488	.0185	**41.4**	.0459	.0158	**33.3**	.0461
Dependent children (C_6)	.0041	**8.6**	-.0552	.0039	**8.8**	-.0610	.0035	**7.4**	-.0641
Dependent spouse (C_7)	.0014	**2.9**	-.2126	.0013	**2.9**	-.2237	.0012	**2.5**	-.2349
Rents (C_8)	.0009	**1.9**	-.2697	.0008	**1.8**	-.2849	.0007	**1.5**	-.2893
Other expenses (C_4)	.0003	**0.6**	.4325	.0003	**0.7**	.4218	.0002	**0.4**	.4172
Dependent parents (C_9)	.0001	**0.2**	-.4364	.0001	**0.2**	-.4545	.0001	**0.2**	-.3895
Mortgage interest payments (C_2)	.0001	**0.2**	.3277	.0001	**0.2**	.3119	.0001	**0.2**	.3048
Lone parents (C_{10})	.0000	**0.0**	-.4534	.0000	**0.0**	-.4999	.0000	**0.0**	-.5544
Minimum limits for PIT (C_1)	.0000	**0.0**	-.1602	.0000	**0.0**	-.1020	.0000	**0.0**	-.1220
Education expenses (C_{11})	.0000	**0.0**	.2621	.0000	**0.0**	.2595	.0000	**0.0**	.2506
Insurance premiums (C_{12})	.0000	**0.0**	.4684	.0000	**0.0**	.4589	.0000	**0.0**	.4528
Building and refurbishing costs (C_3)	.0001	**0.2**	.3802	.0002	**0.5**	.3722	-.0001	**-0.2**	.3672
Health-related expenses (C_{13})	-.0001	**-0.2**	.4104	.0000	**0.0**	.3981	-.0001	**-0.2**	.3932
Deductions and exemptions (*D*)	**.0020**	**4.2**	**.3192**	**.0018**	**4.1**	**.2973**	**.0098**	**20.6**	**-.0264**
PIT: main residence (D_3)	.0019	**4.0**	.1191	.0017	**3.8**	.1265	.0016	**3.4**	.1221
PIT: self-employed SICs (D_7)	.0002	**0.4**	.3993	.0002	**0.5**	.3975	.0001	**0.2**	.3774
PIT: other expenses (D_4)	.0000	**0.0**	.4110	.0000	**0.0**	.4021	.0000	**0.0**	.4009
PIT: maintenance payments (D_6)	.0000	**0.0**	.4648	.0000	**0.0**	.4654	.0000	**0.0**	.4511
PIT: private pension contribution (D_5)	-.0001	**-0.2**	.4453	.0000	**0.0**	.4303	-.0001	**-0.2**	.4291
Disability pensions (D_{10})							.0026	**5.5**	.0295
Social pension (D_8)							.0023	**4.8**	-.6162
Family allowances (D_9)							.0014	**2.9**	-.3436
REI (D_{17})							.0006	**1.3**	-.9148
80 euro bonus (D_{18})							.0006	**1.3**	.1619
New Born bonus (D_{19})							.0003	**0.6**	-.3536
Child benefits (D_{13})							.0001	**0.2**	-.5230
Maternity payments (D_{14})							.0001	**0.2**	-.2842
Minimum Insertion Income (D_{12})							.0001	**0.2**	-.2794
Housing benefits (D_{11})							.0001	**0.2**	-.2238
Mother bonus (D_{20})							.0000	**0.0**	.0100
Non-taxable rental income (D_{16})							.0000	**0.0**	.4255
Scholarships and grants (D_{15})							.0000	**0.0**	.4390
Reranking (*R*)	**.0007**	**1.5**		**.0007**	**1.6**		**.0010**	**2.1**	
Redistributive effect (*RE*)	**.0481**	**100.0**		**.0447**	**100.0**		**.0475**	**100.0**	
Pre-tax Gini index (G_Y)	.4141			.4135			.3875		
Post-tax Gini index (G_{Y-T})	.3661			.3689			.3401		

Relative contributions of taxes and benefits applying U14 for the 2005 tax period (unit of analysis: equivalent household): full results

TAX-BENEFIT INSTRUMENT	**Scenario 3**						**Scenario 4**					
	H	**%**	**V**	**%**	**T**	**%**	**H**	**%**	**V**	**%**	**T**	**%**
PIT (S_1)	-.0028	**31.8**	-.0535	**71.6**	-.0508	**77.2**	.0022	**6.5**	.0529	**42.2**	.0508	**55.4**
Arrears and severance pay (S_3)	-.0000	**0.0**	-.0021	**2.8**	-.0021	**3.2**	.0001	**0.3**	.0022	**1.8**	.0021	**2.3**
Regional surtax (S_2)	-.0001	**1.1**	-.0013	**1.7**	-.0012	**1.8**	.0001	**0.3**	.0013	**1.0**	.0012	**1.3**
Deposits (S_8)	.0000	**0.0**	-.0004	**0.5**	-.0004	**0.6**	-.0001	**-0.3**	.0003	**0.2**	.0004	**0.4**
Other bonds (S_4)	.0000	**0.0**	-.0002	**0.3**	-.0002	**0.3**	.0000	**0.0**	.0002	**0.2**	.0002	**0.2**
Dividends (S_5)	.0000	**0.0**	-.0001	**0.1**	-.0001	**0.2**	.0000	**0.0**	.0001	**0.1**	.0001	**0.1**
Government bonds (S_6)	.0000	**0.0**	-.0001	**0.1**	-.0001	**0.2**	.0000	**0.0**	.0001	**0.1**	.0001	**0.1**
Private pensions (S_7)	.0000	**0.0**	.0000	**0.0**	.0000	**0.0**	.0000	**0.0**	.0000	**0.0**	.0000	**0.0**
SICs: employer (S_{10})							.0196	**57.8**	.0358	**28.5**	.0163	**17.8**
SICs: employee (S_{11})							.0059	**17.4**	.0114	**9.1**	.0055	**6.0**
SICs: self-employed (S_{12})							-.0004	**-1.2**	.0037	**3.0**	.0041	**4.5**
Social pension (D_8)	-.0007	**8.0**	-.0059	**7.9**	-.0052	**7.9**	.0007	**2.1**	.0059	**4.7**	.0052	**5.7**
Family allowances (D_9)	-.0002	**2.3**	-.0048	**6.4**	-.0046	**7.0**	-.0004	**-1.2**	.0042	**3.3**	.0046	**5.0**
Disability pension (D_{10})	-.0039	**44.3**	-.0058	**7.8**	-.0019	**2.9**	.0049	**14.5**	.0067	**5.3**	.0019	**2.1**
Minimum Insertion Income (D_{12})	-.0004	**4.5**	-.0006	**0.8**	-.0002	**0.3**	.0004	**1.2**	.0006	**0.5**	.0002	**0.2**
Housing benefits (D_{11})	-.0001	**1.1**	-.0004	**0.5**	-.0002	**0.3**	.0001	**0.3**	.0003	**0.2**	.0002	**0.2**
Child benefit (D_{13})	-.0000	**0.0**	-.0001	**0.1**	-.0001	**0.2**	.0000	**0.0**	.0001	**0.1**	.0001	**0.1**
Maternity payment (D_{14})	-.0001	**1.1**	-.0001	**0.2**	.0001	**-0.1**	.0002	**0.6**	.0001	**0.1**	-.0001	**-0.1**
Scholarships and grants (D_{15})	-.0004	**4.5**	-.0002	**0.3**	.0002	**-0.3**	.0004	**1.2**	.0002	**0.2**	-.0002	**-0.2**
Non-taxable rental income (D_{16})	-.0001	**1.1**	.0009	**-1.2**	.0010	**-1.5**	.0003	**0.9**	-.0007	**-0.6**	-.0010	**-1.1**
Total effect (*E*)	**-.0088**	**100.0**	**-.0747**	**100.0**	**-.0658**	**100.0**	**-.0339**	**100.0**	**-.1254**	**100.0**	**-.0917**	**100.0**

Relative contributions of taxes and benefits applying U14 for the 2018 tax period (unit of analysis: equivalent household): full results

TAX-BENEFIT INSTRUMENT	Scenario 3						Scenario 4					
	H	**%**	**V**	**%**	**T**	**%**	**H**	**%**	**V**	**%**	**T**	**%**
PIT (S_1)	-.0045	**28.5**	-.0566	**59.0**	-.0521	**65.1**	-.0045	**10.5**	-.0566	**38.6**	-.0521	**50.2**
Proportional tax on rental income (S_9)	.0000	**0.0**	-.0021	**2.2**	-.0021	**2.6**	.0006	**-1.4**	-.0015	**1.0**	-.0021	**2.0**
Regional surtax (S_2)	-.0003	**1.9**	-.0024	**2.5**	-.0021	**2.6**	-.0003	**0.7**	-.0024	**1.6**	-.0021	**2.0**
Arrears and severance pay (S_3)	.0000	**0.0**	-.0015	**1.6**	-.0015	**1.9**	.0000	**0.0**	-.0015	**1.0**	-.0015	**1.4**
Dividends (S_5)	.0000	**0.0**	-.0001	**0.1**	-.0001	**0.1**	.0000	**0.0**	-.0001	**0.1**	-.0001	**0.1**
Government bonds (S_6)	.0000	**0.0**	.0000	**0.0**	.0000	**0.0**	.0000	**0.0**	.0000	**0.0**	.0000	**0.0**
Other bonds (S_4)	.0000	**0.0**	.0000	**0.0**	.0000	**0.0**	.0000	**0.0**	.0000	**0.0**	.0000	**0.0**
Private pensions (S_7)	.0000	**0.0**	.0000	**0.0**	.0000	**0.0**	.0000	**0.0**	.0000	**0.0**	.0000	**0.0**
Deposits (S_8)	.0000	**0.0**	.0000	**0.0**	.0000	**0.0**	.0000	**0.0**	.0000	**0.0**	.0000	**0.0**
SICs: employer (S_{10})							-.0205	**47.9**	-.0362	**24.7**	-.0157	**15.1**
SICs: employee (S_{11})							-.0070	**16.4**	-.0131	**8.9**	-.0061	**5.9**
SICs: self-employed (S_{12})							-.0005	**1.2**	-.0024	**1.6**	-.0019	**1.8**
Social pension (D_8)	-.0013	**8.2**	-.0086	**9.0**	-.0073	**9.1**	-.0013	**3.0**	-.0086	**5.9**	-.0073	**7.0**
Disability pensions (D_{10})	-.0083	**52.5**	-.0136	**14.2**	-.0054	**6.8**	-.0099	**23.1**	-.0153	**10.4**	-.0054	**5.2**
Family allowances (D_9)	-.0001	**0.6**	-.0046	**4.8**	-.0044	**5.5**	.0005	**-1.2**	-.0040	**2.7**	-.0044	**4.2**
REI (D_{17})	.0000	**0.0**	-.0020	**2.1**	-.0020	**2.5**	.0000	**0.0**	-.0020	**1.4**	-.0020	**1.9**
80 euro bonus (D_{18})	-.0002	**1.3**	-.0016	**1.7**	-.0014	**1.8**	.0008	**-1.9**	-.0006	**0.4**	-.0014	**1.4**
New Born bonus (D_{19})	-.0001	**0.6**	-.0008	**0.8**	-.0008	**1.0**	.0001	**-0.2**	-.0007	**0.5**	-.0008	**0.8**
Child benefits (D_{13})	.0000	**0.0**	-.0003	**0.3**	-.0003	**0.4**	.0000	**0.0**	-.0003	**0.2**	-.0003	**0.3**
Housing benefits (D_{11})	-.0002	**1.3**	-.0005	**0.5**	-.0003	**0.4**	-.0001	**0.2**	-.0005	**0.3**	-.0003	**0.3**
Maternity payments (D_{14})	.0000	**0.0**	-.0003	**0.3**	-.0003	**0.4**	.0000	**0.0**	-.0002	**0.1**	-.0003	**0.3**
Minimum Insertion Income (D_{12})	-.0001	**0.6**	-.0003	**0.3**	-.0002	**0.3**	-.0001	**0.2**	-.0003	**0.2**	-.0002	**0.2**
Mother bonus (D_{20})	.0000	**0.0**	-.0002	**0.2**	-.0001	**0.1**	.0000	**0.0**	-.0001	**0.1**	-.0001	**0.1**
Non-taxable rental income (D_{16})	.0000	**0.0**	.0000	**0.0**	.0000	**0.0**	.0000	**0.0**	.0000	**0.0**	.0000	**0.0**
Scholarships and grants (D_{15})	-.0006	**3.8**	-.0003	**0.3**	.0003	**-0.4**	-.0005	**1.2**	-.0002	**0.1**	.0003	**-0.3**
Total effect (*E*)	**-.0158**	**100.0**	**-.0959**	**100.0**	**-.0800**	**100.0**	**-.0428**	**100.0**	**-.1465**	**100.0**	**-.1037**	**100.0**

Notes

1. For the case of Italy, the most up-to-date non-behavioural models and their primary characteristics are as follows: SM2 (Betti et al., 2011), whose peculiar trait is the employment of its net-to-gross algorithm in order to obtain IT-SILC's gross income variables (Istat, 2011); BETAMOD (Albarea et al., 2015), known for its accuracy in estimating individual tax evasion rates; Di Nicola et al. (2015), the static model of the Italian Department of Finance based on an exact match between sample survey data and individual tax returns; TREMOD (Azzolini et al., 2017), one of the few examples in the Italian context of regional microsimulation modelling; BIMic (Curci et al., 2017), the Bank of Italy's model whose estimations of immovable and movable property values are generally more precise than other models employing non-administrative data; MicroReg (Maitino et al., 2017), focused on indirect taxes and in-kind transfers; finally, MAPP© (Baldini et al., 2015a; Boscolo, 2019), whose strength relies above all on the simulation of in-cash and in-kind transfers as well as proportional taxes and income sources exempt from progressive taxation.
2. Italian politics has the peculiar characteristic to be particularly entertaining. Shortly after the writing of this manuscript, the ruling coalition made up by the Five Star Movement and the League fell apart, and with it also the proposal of a flat tax scheme on personal income.
3. Contrary to the approach just discussed, the so-called *natural* decomposition rule as defined in Kristjánsson (2013) computes the effect of each tax-benefit instrument on their corresponding tax bases. This opposite method has been introduced as a technique for analysing the redistributive effect of a dual income tax system, where labour income is subject to progressive marginal tax rates and capital income to alternative proportional tax regimes.
4. The sum of changes in post-tax/benefit Gini indices in response to proportional increases (β) in pre-tax/benefit income ($Y-Ben$), taxes (T) and benefits (Ben), is equal to zero, precisely $\left[G_{Y-T}^{(Y-Ben)(1-\beta)} - G_{Y-T}\right] + \left[G_{Y-T}^{T(1-\beta)} - G_{Y-T}\right] + \left[G_{Y-T}^{Ben(1-\beta)} - G_{Y-T}\right] = 0$. It may be worth to remind that the magnitude of the proportional increase does not affect the calculation of single contributions.
5. To simplify matters, in what follows we will often make use of a restricted notation. A first superscript containing the term *Si* indicates the *i-th* scenario to which each redistributive index refers. A further superscript precedes the latter when differentianting for decomposition approach. To indicate the tax-benefit system under study, a subscript equal to '05' or '18' is added, which is in turn preceded by a numerical subscript when referring to specific tax-benefit instruments. This is not applied to concetration indices, where the superscript stands for the tax period chosen and the subscript is made up of two terms, the

first indicating the variable whose concentration index is calculated, while the second represents the variable used for ordering households.

6. PIT brackets and tax rates in 2005 (values in euros): 1) up to 26,000: 23%; 2) 26,001-33,500: 33%; 3) 33,501-100,000: 39%; 4) over 100,000: 43%. PIT brackets and tax rates in 2018 (values in euros): 1) up to 15,000: 23%; 2) 15,001-28,000: 27%; 3) 28,001-55,000: 38%; 4) 55,001-75,000: 41%; 5) over 75,000: 43%.
7. Several regions have modulated additional tax rates and introduced exemptions in such a way to achieve progressivity over the period 2005-2018. Just five regions out of twenty-one applied graduated tax rates in 2005, a number that grew to twelve in 2018.
8. https://www1.finanze.gov.it/finanze3/pagina_dichiarazioni/dichiarazioni.php: statistics on tax returns released by the Italian Department of Finance – MEF.
9. The following non-taxable income components are included within the category of disability pensions: Civil Infirmity Allowance (*Prestazione di invalidità civile*); Monthly Assistance Allowance (*Assegno mensile di assistenza*); Accompany Benefit (*Indennità di accompagnamento*); Frequency Benefit (*Indennità di frequenza*); Sightness Pension (Pensione di cecità); Special Benefit (Indennità speciale); Deaf-Dumb Pension (*Pensione ai sordomuti*); Communication Benefit (*Indennità di comunicazione*); Personal Long-term Assistance Allowance (*Assegno per assistenza personale continuativa*).
10. Despite being commonly defined as a tax credit, this measure is not embedded within the structure of PIT and so it is considered here. The contribution to the overall redistributive effect was computed considering the bonus as an income source exempt from taxation for all decomposition approaches employed.
11. The measure has been recently replaced by *Reddito di Cittadinanza* (RdC), an enhanced minimum income scheme active since March 2019; the differences between the two benefits lie in a more generous sum granted by the new scheme in place, which is still conditioned on the willingness of the individual of being employed or reactivated, and in compliance with further patrimonial requirements. For a detailed examination of the measures see Monticelli (2019).
12. The ratio of SICs' contribution on that of progressive taxation jointly considered is equal to 49.9% and 56.0% for the 2005 and 2018 tax-benefit system respectively. It is worth reminding that SICs stood for a total amount of 214 billion euros in 2005, which is 1.63 times higher than PIT and regional surtax jointly considered. As far as the 2018 year is concerned, taking the 2016 administrative data (the most recent available), SICs amounted to 228.4 billion euros with a ratio of 1.36.

References

Albarea A., Bernasconi M., Di Novi C., Marenzi A., Rizzi D. and Zantomio F. (2015). Accounting for tax evasion profiles and tax expenditures in microsimulation modelling. The BETAMOD model for personal income taxes in Italy. *International Journal of Microsimulation*, 8(3): 99-136.

Azzolini D., Bazzoli M., De Poli S., Fiorio C. and Poy S. (2017). Developing and Validating Regional Microsimulation Models. TREMOD: The Tax-Benefit Model of the Italian Province of Trento. *Economia Pubblica*, 1: 5-33.

Baldini M., Giarda E. and Olivieri A. (2015a). A Tax-Benefit Microsimulation Model for Italy: A Partial Evaluation of Fiscal Consolidation in the Period 2011-2014. *Prometeia Nota di Lavoro* 1.

Baldini M., Giarda E., Olivieri A., Pellegrino S. and Zanardi A. (2015b). Il "Bonus" degli 80 euro: caratteristiche ed effetti redistributivi. *Rivista di Diritto Finanziario e Scienza delle Finanze*, LXXIV(I): 3-22.

Baldini M., Casabianca E.J., Giarda E. and Lusignoli L. (2018). The impact of REI on Italian households' income: a micro and macro evaluation. *Prometeia Nota di Lavoro* 1.

Baldini M. and Rizzo L. (2019a). *Flat tax. Parti uguali tra disuguali?* Bologna: Il Mulino.

Baldini M. and Rizzo L. (2019b). *Però la flat tax di Salvini piatta non è*. lavoce.info, 29.03.2019.

Barbetta G.P., Pellegrino S. and Turati G. (2018). What Explains the Redistribution Achieved by the Italian Personal Income Tax? Evidence from Administrative Data. *Public Finance Review*, 46(1): 7-28.

Bargain O. and Callan T. (2010). Analysing the effects of tax-benefit reforms on income distribution: a decomposition approach. *The Journal of Economic Inequality*, 8: 1-21.

Bazzoli M., De Poli S. and Fiorio C. (2017). The impacts of the Renzi government's economic policies on income distribution. In S. Ginebri (Ed.), *Italian Fiscal Policy Review 2015*. Roma: RomaTrE-Press.

Beraldo S. and Esposito G. (2019). *Cedolare secca: una flat tax che ha ridotto il gettito*. lavoce.info, 19.04.19.

Betti G., Donatiello G. and Verma V. (2011). The Siena microsimulation model (SM2) for net-gross conversion of EU-SILC income variables. *International Journal of Microsimulation*, 4(1): 35-53.

Boscolo S. (2019). Quantifying the Redistributive Effect of the Erosion of the Italian Personal Income Tax Base: A Microsimulation Exercise. *Economia Pubblica*: forthcoming.

Ceriani L. and Gigliarano C. (2010). *EUROMOD Country Report. ITALY (IT) 2005-2008*. https://www.euromod.ac.uk/using-euromod/country-reports/f3-g4.

Creedy J. and Van de Ven J. (2002). Decomposing redistributive effects of taxes and transfers in Australia: annual and lifetime measures. *Australian Economic Papers*, 40(2): 185-198.

Curci N., Savegnago M. and Cioffi M. (2017). BIMic: The Bank of Italy microsimulation model for the Italian tax and benefit system. *Bank of Italy Occasional Papers* no. 394.

Di Caro P. (2018). Redistribution in real-world PIT: Evidence from Italian tax records. *Department of Finance Working Paper* No. 2.

Duclos J.Y. (1993). Progressivity, redistribution, and equity, with application to the British tax and benefit system. *Public Finance*, 48(3): 350-365.

Fuest C., Niehues J. and Peichl A. (2010). The Redistributive Effects of Tax Benefit Systems in the Enlarged EU. *Public Finance Review*, 38(4): 473-500.

Gastaldi F., Liberati P., Pisano E. and Tedeschi S. (2017). Regressivity-Reducing VAT Reforms. *International Journal of Microsimulation*, 10(1): 39-72.

Guillaud E., Matthiew O. and Michaêl Z. (2019). Four levers of redistribution: the impact of tax and transfer systems on inequality reduction. *Review of Income and Wealth*: Early View.

Hümbelin O. and Farys R. (2018). Income redistribution through taxation – how deductions undermine the effect of taxes. *Journal of Income Distribution*, 25(1): 1-35.

Immervoll H., Levy H., Lietz C., Mantovani D., O'Donoughe C., Sutherland H. and Verbist G. (2005). Household Incomes and Redistribution in the European Union: Quantifying the Equalising Properties of Taxes and Benefits. *IZA Discussion Papers* No. 1824.

Kakwani N.C. (1984). On the Measurement of Tax Progressivity and Redistribution Effect of Taxes with Applications to Horizontal and Vertical Equity. *Advances in Econometrics*, 3: 149-168.

Kristjánsson A.S. (2011). Income redistribution in Iceland: development and European comparisons. *European Journal of Social Security*, 13(4): 392-423.

Kristjánsson A.S. (2013). Redistributive effects in a Dual Income Tax System. *FinanzArchiv: Public Finance Analysis*, 69(2): 148-166.

Lambert P.J. (2002). *The Distribution and Redistribution of Income: Third Edition.* Manchester: Manchester University Press.

Lerman R.I. and Yitzhaki S. (1985). Income Inequality Effects by Income Source: A New Approach and Applications to the United States. *The Review of Economics and Statistics*, 67(1): 151-156.

Maitino M.L., Ravagli L. and Sciclone N. (2017). MicroReg: a Traditional Tax-Benefit Microsimulation Model Extended to Indirect Taxes and In-Kind Transfers. *International Journal of Microsimulation*, 10(1): 5-38.

MEF (Ministry of Economy and Finance). 2019. *Documento di Economia e Finanza 2019. Sezione III: Programma Nazionale di Riforma.* Rome.

Monticelli E. (2019). *Il nuovo Reddito di cittadinanza ed il Rei: analogie e differenze.* Menabò di Etica ed Economia, 31.01.2019.

Morger M. and Schaltegger C.A. (2018). Income tax schedule and redistribution in direct democracies – the Swiss case. *The Journal of Economic Inequality*, 16(3): 413-438.

O'Donoghue C. (2014). *Handbook of Microsimulation Modelling.* Bingley: Emerald.

Onrubia J., Picos-Sánchez F. and del Carmen Rodado M. (2014). Rethinking the Pfähler-Lambert decomposition analyse real world personal income taxes. *International Tax and Public Finance*, 21(4): 796-812.

Orcutt G.H. (1957). A New Type of Socio-Economic System. *The Review of Economics and Statistics*, 39(2): 116-123.

Reynolds M. and Smolensky E. (1977). *Public Expenditures, Taxes, and the Distribution of Income: The United States, 1950, 1961, 1970.* New York: Academic Press.

Rossi N. (2018). *Flat tax. Aliquota unica e minimo vitale per un fisco semplice ed equo.* Venice: Marsilio Editori.

Shorrocks A.F. (1980). The Class of Additively Decomposable Inequality Measures. *Econometrica*, 48(3): 613-625.

Stevanato D. (2016). *Dalla crisi dell'Irpef alla flat tax: prospettive per una riforma dell'imposta sul reddito.* Bologna: Il Mulino.

Sutherland H. and Figari F. (2013). EUROMOD: the European Union tax-benefit microsimulation model. *International Journal of Microsimulation*, 6(1): 4-26.

Urban I. (2008). Income redistribution in Croatia: the role of individual taxes and social transfers. *Financial Theory and Practice*, 3(2): 387-403.

Urban I. (2014). Contributions of taxes and benefits to vertical and horizontal effects. *Social Choice and Welfare*, 42(3): 619-645.

Verbist G. and Figari F. (2013). The redistributive effect and progressivity of taxes revisited: An International Comparison across the European Union. *Gini Discussion Paper* 88.

Wagstaff A. and Van Doorslaer E. (2001). What Makes the Personal Income Tax Progressive? A Comparative Analysis for Fifteen OECD Countries. *International* Tax *and Public Finance*, 8: 299-315.