

The contribution of tax statistics for analysing regional income disparities in Italy*

by

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Abstract

The study of income inequality within countries is becoming of particular importance, also in the light of the spatial effects of the Great Recession. This paper uses newly available tax record data on the Italian case for providing novel evidence on regional income disparities in this country. Three main objectives are achieved. Income disparities in Italy are characterized by within- and across- regional patterns. Specific dimensions of analysis such as gender, age class, and households' composition provide additional insights on inequalities in this country. The place-specific effects of the Italian personal income tax and its main elements are quantified and interpreted. Specifically, the redistributive capacity of tax schedules and tax expenditures across and within regions is investigated. In addition, the potential original role of using tax files for studying inequality issues in Italy as in other countries is discussed. The final sections summarises and presents some possible future avenues of research.

Keywords: Tax statistics; Regional income disparities; Inequality decomposition.

JEL classification: D31, H23, H24.

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1. Introduction

In the past three-plus years, the role of tax administrative microdata for the study of inequality issues and the analysis of the effects of tax policies on the distribution of wealth and income has regained importance among academics and policymakers. Since the publication of the Piketty's bestseller 'Capital in the Twenty-First Century' (Piketty 2014), the availability of detailed tax statistics has represented a crucial informative instrument for comparing the design of ideal tax systems with real-world taxes (Seidl *et al.*, 2013).¹ From an empirical research perspective, tax records allow for the analysis of the redistributive capacity of a given tax-benefit system by providing detailed and updated information on taxpayers and improving the representativeness of the sample under observation (Bourguignon, 2016). Yet, the access to tax administrative microdata for research purposes has been limited to date due to the presence of several problems mostly related to the privacy of taxpayers.

The spatial dimension of income inequality is currently at the forefront of the public debate, also in the light of the uneven territorial consequences of the Great Recession (OECD, 2015a). Cross-country comparisons among OECD members found differences in household income distribution across and within regions located in the different nations (OECD, 2016). Noteworthy, these regional differences were amplified during the recent economic and financial crisis, particularly in the European Union (EU Commission, 2015). In Italy, alike in other countries characterized by territorial inequalities (e.g. Germany, Spain, the U.K.), the Great Recession contributed to renewing the discussion on the rooted internal economic divides and the existence of place-specific patterns of income inequality. Recently, the Italian National Institute of Statistics (ISTAT) worried about the fact that about half of the population living in the South of Italy – the so-called *Mezzogiorno* – faces the risks of poverty and social exclusion; in the rest of the country less than 20% of total population is at risk of poverty (ISTAT, 2016). The big chill originating from the Great Recession produced the most adverse effects on poor households, women and youths living in the *Mezzogiorno*, which fell further behind (Brandolini, 2014).

The main aim of this paper is to provide novel evidence on the study of regional income disparities in Italy by exploiting the informative contents of newly available tax

¹ In what follows, we use interchangeably the terms tax records, tax files, tax returns, and tax statistics for describing tax administrative microdata.

administrative microdata on individual tax returns elaborated by the Italian Ministry of Economy and Finance (MEF). Specifically, our work contributes to the existing literature along three main directions. First, the analysis of regional inequality and redistributive issues carried out by using tax statistics integrates previous studies that adopt different data sources such as aggregate indicators and survey-based observations (Piacentini, 2014). This is particularly relevant for the Italian case, where the adoption of tax administrative data for studying distributive aspects has been quite limited to date (Barbetta *et al.*, 2016). Second, we contribute to the study of the regional patterns of income inequality (Doran and Doran, 2013), by developing an empirical analysis that benefits from the detailed informative contents of our tax file. Third, we participate to the current debate on the place-specific redistributive consequences of personal income taxes (Golladay and Haveman, 2013) by explicitly investigating how tax schedules and tax credits - preferential tax treatments of specific individuals or economic activities - operate on a regional level. In Italy, the assessment of the distributive implications of tax credits becomes important given the high number of tax expenditures within the Italian tax system (Tyson, 2014).

The remaining of the paper is structured as follows. Section 2 reviews the main research lines that are directly related to our work. Section 3 describes the data and provides an overview of the Italian personal income tax. Section 4 presents the empirical analysis. Section 5 contains the summary of the results and proposes some possible future avenues of research.

2. Related literature

Our analysis draws upon three main research areas. The work presented hereafter is primarily linked to the study of income inequality and distributive issues by means of tax statistics data (Atkinson *et al.*, 2011). Tax records have been progressively used for comparing income disparities across and within countries and assessing the redistributive capacity of particular tax systems (Kopczuk and Saez, 2004). Using tax files for Spain, Bonhomme and Hospido (2013) provided detailed evidence on the role of the regional and gender dimensions for understanding the redistributive capacity of the Spanish tax system. Atkinson *et al.* (2016) benefited from the availability of tax record data for evaluating the national- and time-specific features of gender inequalities in eight countries by looking at the temporal and spatial evolution of top incomes. In Italy, two recent works employed tax administrative data in order to throw further light into the study of redistribution in this

country. By combining tax return data (obtained from MEF) and survey-based information (from the EU-SILC databank) on an individual level, Di Nicola *et al.* (2015) evaluated the redistributive implications of the Italian personal income tax – *Imposta sul Reddito delle Persone Fisiche* (IRPEF) - and simulated the effects of alternative policy scenarios. Barbetta *et al.* (2016) provided new insights on the redistributive role of the Italian personal income tax by using more than one million of tax returns for the fiscal year 2011. As recognized by the authors, however, the Barbetta *et al.* (2016)'s sample is not fully representative of the Italian population due to the high representation of dependent workers and pensioners in the databank. In this paper, we use tax microdata that are representative of the Italian population of taxpayers, that is, our sample contains information on dependent workers, self-employed, pensioners, etc. This is an additional positive aspect of our tax statistics that allow for the integration of the findings deriving from survey-based analyses (Figari *et al.*, 2015).

In addition, our contribution is related to the strand of empirical literature that investigate income inequality and, in particular, the redistributive capacity of the tax system by adopting a spatial perspective (Bishop *et al.*, 1992). Using data from the European Community Household Panel survey for the period 1995-2000, Rodriguez-Pose and Tselios (2009) explored the occurrence of place-specific patterns of inequality in 102 European regions (NUTS2 European classification level). By adopting a different database, namely the Luxembourg Income Study, Perugini and Martino (2010) provided detailed evidence on economic inequality across the European regions – NUTS1 and NUTS2 of the EU classification levels – from 1995-2004 by pointing out the importance of analysing distributive aspects from a regional point of view. Limiting the attention to income inequality within specific countries, recent evidence has been presented on: Austrian municipalities (Moser and Schnetzer, 2015), Canadian provinces (Breau and Saillant, 2016), and Portuguese regions (Pereira and Galego, 2014). All these studies suggest to further scrutinise regional income inequalities, particularly in the recent times.

Finally, this paper brings new insights into the study of regional inequalities in Italy by using administrative microdata deriving from tax returns that adds to the existing literature relying upon different informative sources (Terrasi, 1999). Massari *et al.* (2009) investigated the spatial distribution of household income among Italian regions by introducing price differentials across territorial units; the authors found a significant role of price differentials for explaining regional income disparities. By applying Gini-based

indicators to the Survey of Household Income and Wealth elaborated by the Bank of Italy from 1993 to 2000, Liberati and Yitzhaki (2012) highlighted the relevance of studying the permanent aspects of income inequality in Italy by looking at the regional dimension. Using tax records for the Italian provinces over the years 2000-2011, the work of Acciari and Mocetti (2012) addressed two issues, namely the asymmetric territorial distribution of income inequality across Italy and determining factors of such divergences.

3. The *Tax File IRPEF 2014*: description and contents

With the aim of providing detailed and updated information on the Italian personal income tax the Department of Finance at the Italian Ministry of Economy and Finance has recently created a sample of tax administrative microdata for the fiscal year 2014 (hereafter, ‘Tax File IRPEF 2014’). Specifically, the sample has been elaborated by adopting the Neyman optimal sampling procedure (Neyman, 1934) with four sampling dimensions – model of tax declaration, geographical area, income classes, and main income category – and provides information on 80,000 anonymised taxpayers.² The sampling data results representative of the Italian population of taxpayers (about 40,716,548 individuals in 2014) filling tax returns for the personal income tax. Figures 1a and 1b compare the average gross income observed for the total population (dark grey) and our sample (light grey) divided by the four Italian regional macro-areas (figure 1a) and main income categories (figure 1b). More details on the sampling procedure can be found in Acciari (2016).

Insert about here.

Figures 1a,b. Comparison between total population and sampling data, by Italian macro-areas and income categories.

The Tax File IRPEF 2014 contains a set of 56 variables. Some variables provide descriptive information on taxpayers such as gender, geographical macro-area, marital status, number of dependent children, main income source. Quantitative information includes the following variables: gross reported income, taxable income, total amount of income for each main income source, gross tax liabilities, net tax liabilities, total tax deductions, and tax credits. In addition, our sample contains the two main tax deductions present in Italy, namely deductions for main residence and pension allowances, and six

² To protect the privacy of individual taxpayers and avoid problems related to the direct and indirect identification of individuals, some variables in the original sample have been excluded and/or capped or rounded following the ‘Disclosure Avoidance Procedures’ used at international level (US IRS, 2016).

different categories of tax credits: dependent family members; employment, retirement, similar to employment; mortgage interests; home restructuring; interventions for energy savings, ‘80 Euro Bonus’. As for the ‘80 Euro Bonus’, that is, the main countercyclical tax policy adopted by the Italian government during the Great Recession (Baldini *et al.*, 2015), we have data on the exact amount of the tax credit net of errors and/or reimbursements (Baldini and Pellegrino, 2016). It is worth noticing that the IRPEF’s elements present in our tax file are the most representative for number of taxpayers and financial amounts (Arachi and Baldini, 2016). A more detailed description of the Italian personal income tax and its main components can be found in OECD (2015b). Table 1 reports descriptive statistics for some of the variables in our dataset.

Insert about here.

Table 1. Tax File IRPEF 2014, descriptive statistics.

The analysis of regional income disparities in Italy by using tax statistics is interesting for several reasons.³ The Italian PIT represents the main tax instrument for achieving progressivity and redistribution in the Italian tax-benefit system, though the limited redistributive capacity in comparison to other European countries (Verbist and Figari, 2014). In 2014, taxpayers filling IRPEF returns counted for about two-thirds of the total Italian population. The Italian PIT is the main source of tax revenues in this country: on September 2016, IRPEF’s revenues reached an amount of 131 billion of euros, around 10% of the Italian gross domestic product (MEF, 2016). The IRPEF design, moreover, relies upon a mixed set of tax expenditures that can influence redistribution both across and within regions. In addition, data derived from tax records used in this paper allows for the study of regional redistributive issues by jointly identifying the spatial patterns of gross income, taxable income, (gross and net) tax liabilities, and net after-tax income.

4. Empirics

This section combines different pieces of evidence in order to investigate the spatial patterns of income inequality in Italy by benefiting from the informative contents of our

³ It is worth remembering that the use of individual tax returns for addressing redistributive issues has some limitations that include the presence of errors in the collection process, the reduced importance of the family as a unit of analysis, and the lack of controls for tax non-compliance (Atkinson *et al.*, 2016). For a more detailed treatment of some of the limitations present in our tax file, see the robustness discussion presented in Di Caro (2016).

tax record data. The first sub-section presents some statistics for the four Italian macro-areas: North-West, North-East, Centre, and South.⁴ The second sub-section contains evidence on the place-specific redistributive effects of the Italian personal income tax and its main elements: tax schedules, deductions, tax credits.

4.1 Spatial patterns of income disparities in Italy

The graphs in figure 2 report the distribution (frequency density function) of gross income for the four Italian macro-areas. The variable gross income used here includes all taxable income subject to IRPEF plus the property income subject to the flat rate *Cedolare Secca*; this variable is used for determining the eligibility of most of tax credits within the IRPEF structure (Arachi and Baldini, 2016). The presence of regional differences in the initial conditions of Italian taxpayers living in the four macro-areas is worth observing. The average reported gross income is distributed as follows: North-West (22,940.44 EUR), North-East (21,391.67 EUR), Centre (20,866.61 EUR), and South (15,972.55 EUR). In general, regions located in the Centre-North register higher reported income than the counterparts located in the *Mezzogiorno*. This preliminary finding reflects the different levels of economic development and structural factors occurring in the Centre-North and in the South, with the former (latter) macro-area registering better (worse) economic and social conditions than the rest of Italy (Checchi and Peragine, 2010).⁵

Insert about here.

Figure 2. Gross Income, macro-regional distribution.

To identify the different components of income inequality in Italy, we first apply a decomposition of the Theil index to our tax file. In our case, the overall Theil index can be divided in two components (Jenkins, 2006). The within component, that is, the weighted sum of the within-region inequality index; and, the between component that describes inter-regional differences in average income. Such decomposition has the main merit of showing how intra- and inter-regional income disparities contribute to determine income inequality in Italy. Specifically, the Theil index for the variable pre-tax gross income is

⁴ The ISTAT defines the four macro-areas as follows: i) North-West: Piemonte, Lombardia, Liguria, Valle d'Aosta; ii) North-East: Trentino A.A., Friuli V.G., Veneto, Emilia Romagna; iii) Centre: Toscana, Marche, Lazio, Umbria; iv) South: Abruzzo, Calabria, Molise, Puglia, Campania, Basilicata, Sardegna, Sicilia. The Centre-North is made up of the combination of North-West, North-East, and South.

⁵ A different explanation can be related to the high propensity of taxpayers living in the *Mezzogiorno* to underreport income given the high non-compliance behavior present in this area (Bordignon and Zanardi, 1997).

0.4143; it is mostly determined by the within-region component that represent about 97% of the total index. This result supports the view that country-specific inequality patterns in the countries of the European Union can be explained by income disparities within the regions of a given country (Bönke and Schröder, 2015). The same weights regarding the within and between components can be observed when using the variable net post-tax income; in this case, the Theil index is about 0.3185. Therefore, the focus on income disparities occurring within Italian regional macro-areas becomes crucial for understanding income inequality in this country.

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Figure 3. Concentration curves, Centre-North and South.

Figure 3 reports the concentration curves for gross income, net income and the net tax liabilities recorded in the Centre-North (left-hand-side graph) and in the *Mezzogiorno* (right-hand-side graph). Observe that, the net tax liabilities are more concentrated in the Southern regions than in the Centre-North. In other words, it can be noted the presence of high (low) concentration of taxes in the South (Centre-North), which reflect differences in the initial economic conditions. More precisely, the regional distribution of the average net tax liability is distributed as follows: North-West (5,010.01 EUR), North-East (4,321.21 EUR), Centre (4,445.76 EUR), and South (2,904.60 EUR). In addition, it is important to evaluate the effects of the Italian PIT on the distribution of income within each macro-area. The Gini coefficients of pre-tax gross income and post-tax net income in the four macro-areas show the following results: North-West (pre-tax 0.4468, post-tax 0.3946), North-East (pre-tax 0.4306, post-tax 0.3828), Centre (pre-tax 0.4643, post-tax 0.4128), and South (pre-tax 0.4754, post-tax 0.4276). These findings confirm the idea that spatial differences in the initial economic conditions are also present when focusing on the distribution of income within regional macro-areas: the standard deviation of the Gini coefficients of pre-tax gross income among the macro-areas is about 0.01975. Yet, the Italian IRPEF plays an important role for reducing inequalities within regions: the standard deviation of the Gini coefficients of post-tax gross income among the four units is about 0.01472.

The set of information in our tax file allows for the provision of additional insights to the study of regional inequalities in Italy. Limiting the attention to gender issues, for instance, it can be noted that the share of women in the top 1% of the distribution of gross

income in the four macro-areas results quite homogenous across places, namely North-West (10.30%), North-East (10.21%), Centre (11.72%), and South (9.70%). The situation becomes more puzzling if we look at the share of women in the bottom 10% of income distribution, which is equal to 58.84% (North-West), 60.12% (North-East), 45.88% (Centre), and 41.13% (South). The latter result, which can appear somewhat misleading *prima facie*, derives from some of the featuring aspects of the Italian labour market that found confirmation in our tax statistics (Colonna and Marcassa, 2015). More precisely, in the Centre-North women are mostly employed in the regular economy, while in the *Mezzogiorno* female labour employment is more spread in irregular activities, notwithstanding in both areas women are generally at the margin of the labour market (Clementi and Giammatteo, 2014). Simply put, information deriving from tax returns are likely to capture the presence of gender disparities at the bottom of the income distribution more accurately in the Centre-North than in the South, where poor women probably do not fill tax returns. Furthermore, poor women living in Southern regions, where the weight of family ties continues to be more pronounced than in the rest of the country (Alesina and Giuliano, 2010), are occupied in home production activities that are not subject to taxes and, as a consequence, do not fill tax returns. These findings suggest that the investigation of gender issues across and within Italian regions claims for the usage of multidimensional indexes (Bozzano, 2012).

Insert about here.

Figure 4. Concentration curves for gross income, by macro-areas and age classes.

The graphs in figure 4 report the concentration curves for gross income observed in the four Italian macro-areas and in Italy as a whole divided by the following age classes (years): 0-35, 36-65, >65. The first age class allows for the description of the young component of taxpayers filling tax returns in Italy; the second class includes most of the individuals in the working age; the third class is almost entirely made up of retired taxpayers. The presence of spatial differences across Italy found confirmation, but some age-specific patterns observable in the different macro-areas are worth commenting upon (Fiorio, 2011). Income differences across geographical areas are less pronounced at the beginning and at the end of the life cycle of Italian taxpayers: the standard deviation of gross income registered in the four macro-areas is about 1,872.87 EUR and 2,304,25 EUR

for the age class 0-35 years and 36-65 years, respectively. As for the first age class, one of the possible explanations can be the common trend observed in the recent years in Italy for which youths show country-wide difficulties to entering the (regular) labour market (Scarpetta *et al.*, 2012). The low dispersion of reported income in the third age class registered on a regional level is due to the high concentration of pensions – that are the main income sources of elderly people - around specific amounts of income. Conversely, territorial divergences are more marked when looking at the age class 36-65 years – the standard deviation is 3,872.04 EUR - that mostly contains the taxpayers perceiving income from different sources. Yet, the situation becomes more puzzling when combining the gender and age dimensions: the average gross income reported by youth women living in the South of Italy is about 70% of that declared by the same category of taxpayers in the rest of the country. Again, these findings can be explained by looking at the specific configuration of the Italian labour market as discussed beforehand. A cautionary note is needed, however, given that our tax file covers the year 2014 – during this year the Great Recession still produced its adverse effects - and the specific gender and age issues taking place in this period had probably influenced tax statistics.

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Figure 5. Densities of gross income, by macro-areas and number of children.

The presence of differences in the household's composition of individual taxpayers provides further insights into the regional distribution of income across Italy. The graphs in figure 5 report the density functions for the (log of) equivalent gross income for the four Italian macro-areas divided by the number of children declared by taxpayers: 0, 1, 2, 3+. The variable gross income has been modified by taking into consideration the number of children; specifically, and following Barbetta *et al.* (2016), the equivalence scale has been calculated as the square root of the number of households' components. For a more detailed discussion on the relevance of taking into consideration different equivalence scales, see Koulovatianos *et al.* (2005). Observe that, territorial asymmetries are particularly relevant for taxpayers with a large number of dependent children: the standard deviation of the equivalent gross income in the four macro-areas for taxpayers with three or more dependent children is about two-thirds higher than that registered for taxpayers with zero dependent children. In addition, the share of the average equivalent gross income reported

in the *Mezzogiorno* with respect to that observed in the macro-area North-West showing the high declared income in the sample reads as follows: 66.9% (0 children), 74.2% (1 child), 68.1% (2 children), 55.3% (3 and more children). In other words, the households' composition plays a relevant role for understanding spatial income disparities in Italy, particularly for young taxpayers (Papagni, 2006). Note that, the average equivalent gross income reported by taxpayers under 35 ages having three or more children living in the *Mezzogiorno* is about half that reported by the same category of taxpayers living in the North-West. Further effort, however, is required in order to study the interactions among regional income disparities, household decisions over the number of children and specific territorial aspects such as asymmetries in liquidity constraints (Filoso and Papagni, 2016).

4.2 The place-specific redistributive effects of the Italian PIT

To analyse the redistributive consequences of the Italian IRPEF from a regional perspective, we apply the decomposition of the Reynolds-Smolensky Index proposed by Onrubia *et al.* (2014). This decomposition makes it possible to overcome some issues deriving from the Pfähler-Lambert (Pfähler, 1990; Lambert, 2001) original approach and evaluate the relevance of the various elements of the PIT in terms of redistribution. Specifically, and following the Onrubia *et al.* (2014)'s original notation, for each macro-area we use the following decomposition:

$$\Pi^{RS} = \frac{\bar{B}}{\bar{Y}-\bar{S}} \frac{S}{\bar{B}} \Pi_{B,B-S}^K - \frac{\bar{Y}}{\bar{Y}-\bar{T}} \sum_{i=1}^m \frac{\bar{C}_i}{\bar{Y}} \Pi_{Y-S,Y-S+C_i}^K - \frac{\bar{Y}\bar{S}}{\bar{B}(\bar{Y}-\bar{S})} \sum_{i=1}^n \frac{\bar{D}_i}{\bar{Y}} \Pi_{Y,Y-D_i}^K - R \quad (1)$$

where:

Y and B are the gross income and the taxable income, respectively; S and T are the gross and the net tax liabilities. C denotes the sum of the $m = 5$ or 6 tax credits (i.e. depending on the introduction of the '80 Euro Bonus'), and D the sum of the $n = 2$ deductions. The presence of an upper bar indicates the average of a variable; $\Pi_{X,Z}^K$ is the Kakwani Index between the generic variables X and Z . The reranking term R captures the presence of effects on horizontal equity (Urban, 2014). For a modified version of the formula in (1) with an application to the Italian case, see Di Caro (2016).

Insert about here.

Table 2. Reynolds-Smolensky decomposition, Italian macro-areas.

Table 2 reports the results after applying the decomposition of the Reynolds-Smolensky Index described in the relation (1) to the distribution of income in the four Italian macro-areas and the entire country by using our tax file. The findings have to be read by remembering that the decomposition of the Reynolds-Smolensky Index has been obtained for each regional area separately and, therefore, reflects the effects of the Italian PIT on a regional level. Some aspects are worth noticing. In general, the set of tax credits contributes more than the other IRPEF's elements for achieving redistributive purposes; this is in line with the results obtained by Barbetta *et al.* (2016) with a different databank. In addition, spatial differences are observed when comparing the redistributive consequences of the IRPEF's elements. In the Centre-North, redistributive objectives are mostly reached by means of tax schedules, while in the *Mezzogiorno* tax credits represent the main redistributive instrument. This result is a direct consequence of the territorial differences in the initial economic conditions among the Italian macro-areas. In the Centre-North, where average reported income is relatively high, tax schedules operate for smoothing the initial distribution of income across taxpayers. In the South, where average reported income is relatively low, tax credits – particularly those determined as decreasing values of income such as tax credits for families and working conditions – play a crucial role for achieving redistribution. The role of deductions is of limited importance in Italy and in the four macro-areas, as well.

As for the effects on horizontal equity, it can be noted that the reranking term is higher in the regions located in the South than in the rest of the country. In other words, IRPEF creates more distortions on the redistribution of income within regions located in the *Mezzogiorno*. More effort, however, is required for understanding the different consequences of the Italian PIT on the horizontal equity of diverse categories of Italian taxpayers (Monti *et al.*, 2015). When the tax credit '80 Euro Bonus' is accounted for as in the results shown at the bottom of Table 2, two further insights can be discussed. This specific tax credit made a positive contribution to reducing income inequality in Italy both on a national and on a regional level. In other words, the bonus contributed to smoothing at least in part the adverse effects of the Great Recession in Italy (Baldini *et al.*, 2015). Yet, it can be noted that the introduction of the '80 Euro Bonus' increased the reranking term in Italy and in the four regional macro-areas. This supports the view that the specific design of the bonus – that

did not take into consideration poor households and was targeted to dependent employment taxpayers (Morini and Pellegrino, 2016) - produced adverse consequences on horizontal equity in Italy and in the four macro-areas, as well.

6. Concluding remarks

If the Great Recession deserved some merits, one could have been to have encouraged further investigations on income disparities and redistribution on a national and international level (Ball *et al.*, 2013). In the recent years, moreover, the relevance of income inequalities within countries has progressively attracted the interest of researchers by posing novel theoretical and practical questions (Kastrop, 2016). This paper has tried to contribute to the study of regional income disparities in Italy by benefiting from the novel informative features of tax statistics. The main results of the work can be summarised as follows. The newly available tax record data called Tax File IRPEF 2014 has been presented with a particular emphasis on the information provided in comparison to previous databanks used for the Italian case. It has been documented that regional income disparities show relevant patterns both within and across the four Italian macro-areas. In particular, the rooted North-South divide found confirmation also when looking at redistributive issues, with regions located in the *Mezzogiorno* lagging behind in terms of income and registering higher within-regional income disparities than the rest of Italy. The importance of taking into consideration additional research dimensions (e.g. gender, age class, households' composition) when studying income disparities from a spatial perspective has been pointed out. In Italy, regional income divergences seem more pronounced for particular categories of taxpayers: youths, women, and large families. Empirical evidence, moreover, has been provided on the asymmetric consequences of the Italian personal income tax and its main elements on redistribution in the four Italian macro-areas. Simply put, tax credits and tax schedules show place-specific patterns in Italy.

Three main extensions can be applied to our analysis, which represent future avenues of research. First, the collection of tax statistics on a longitudinal basis can result helpful for performing more accurate panel analysis on income distribution and evaluating the redistributive consequences of the different tax policies introduced within the Italian personal income tax structure in the past years (Palmisano, 2011). This, however, will pose additional challenges on the influence of time-specific consequences for studying income disparities by means of tax record data (Schröder *et al.*, 2014). Second, further efforts are

needed in order to understand how the combination of different dimensions of analysis can throw additional light into the study of income disparities across and within areas, and the uneven distribution of the effects of personal income taxes. Recent works (De Nardi and Young, 2016), for instance, investigated the relevance of the particular configuration of a given tax system for analysing inequality patterns among youths. Third, the consequences of tax expenditures on redistribution and, in particular, the possible presence of place-specific patterns, have to be further evaluated in order to recalibrate the tax system for smoothing income disparities in a more effective way (Poterba, 2001). These and other questions are left for future work.

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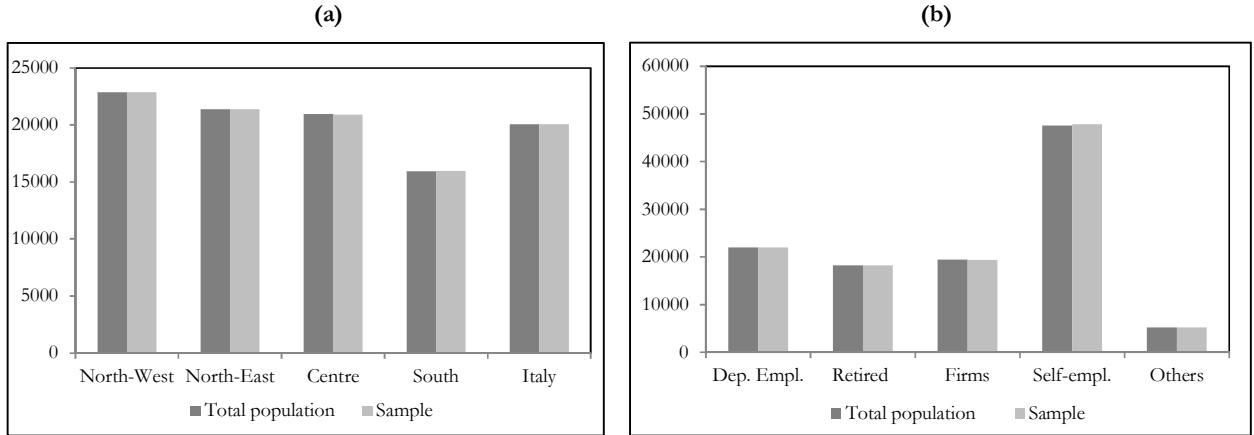
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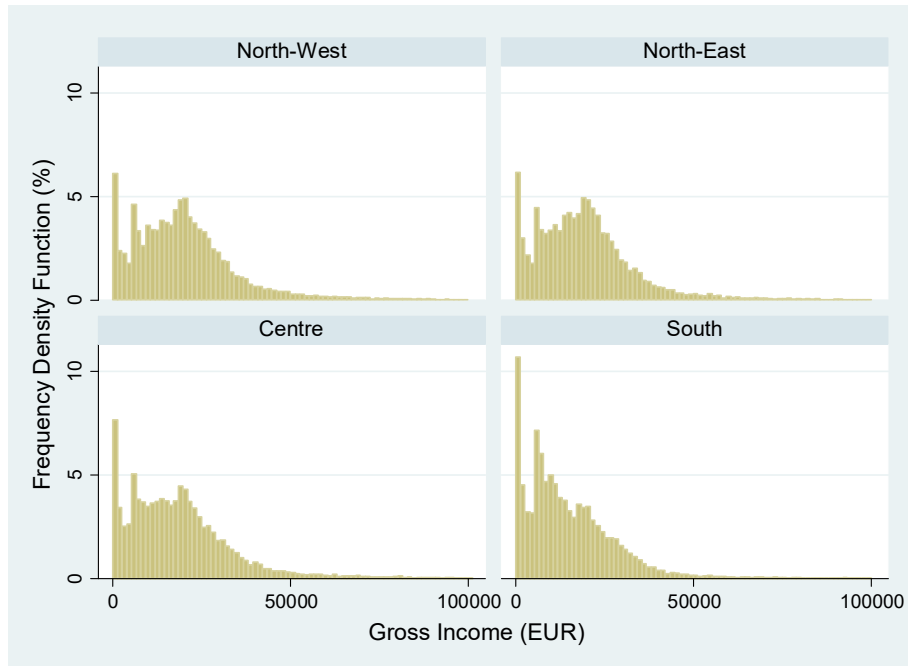
FIGURES AND TABLES

Figures 1a,b. Comparison between total population and sampling data, macro-areas and income categories



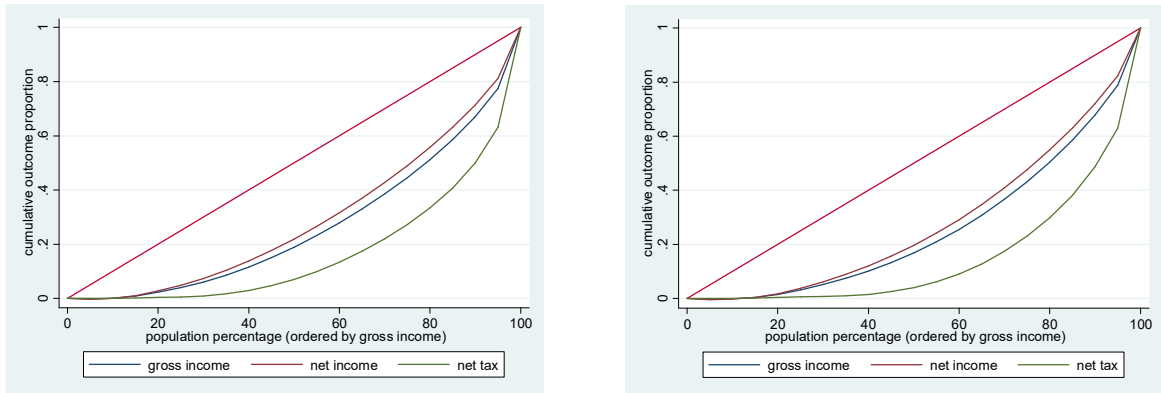
Note: The graphs above compare the average gross income (y -axis) observed for the total population of taxpayers (dark grey) and the sample (light grey) divided by macro-areas (figure 1a) and main income categories (figure 1b).

Figure 2. Gross Income, macro-regional distribution



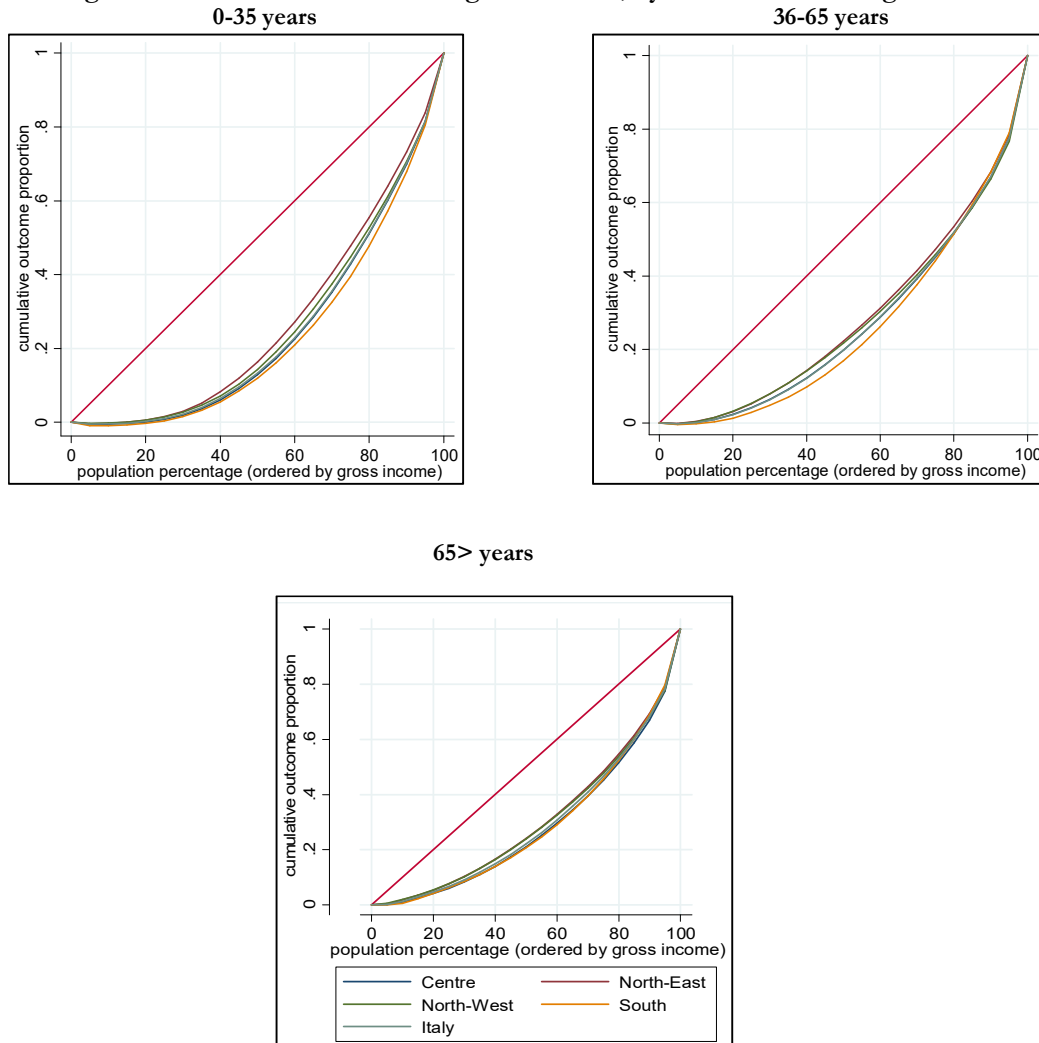
Note: The graphs above plot the frequency density function (y -axis) and the gross income between 0 and 100,000 EUR (x -axis) for the four Italian macro-areas.

Figure 3. Concentration curves, Centre-North and South



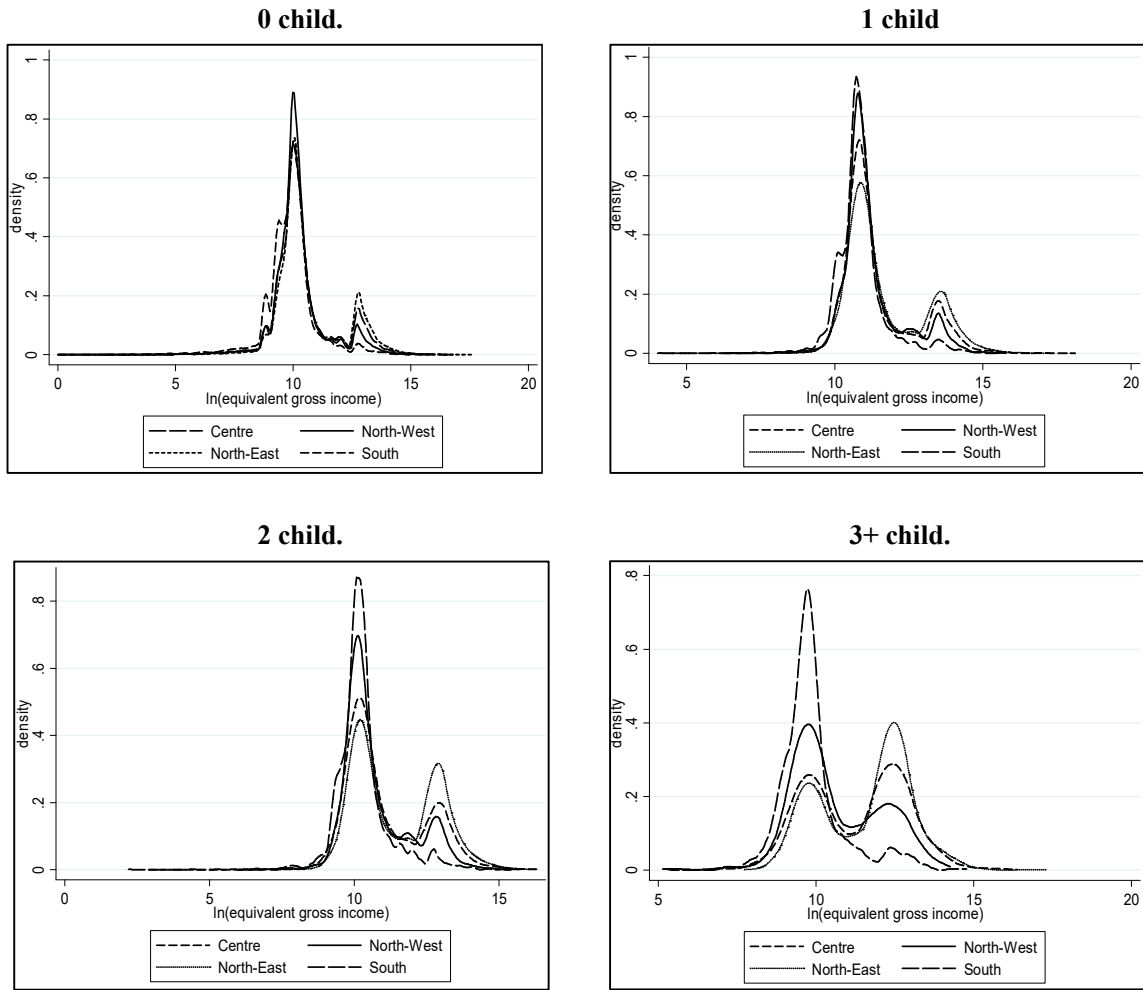
Note: The graphs plot the concentration curves for gross income, net income and net tax (gross tax liabilities minus tax credits) for the Centre-North (on the left) and the South (on the right); the percentage of population (*x*-axis) is ordered by the gross income.

Figure 4. Concentration curves for gross income, by macro-areas and age classes



Note: The graphs plot the concentration curves for gross income divided by macro-areas and age classes.

Figure 5. Densities of equivalent gross income, by macro-areas and n. of children



Note: The graphs plot the kernel densities (y -axis) for the log of the equivalent gross income (x -axis) for the four Italian macro-areas divided by number of children.

TABLES

Table 1. Tax File IRPEF 2014, descriptive statistics

Variable	Mean	St.dev.	Min	Max
Gross Income	20,087.67	36,789.20	-708,979	5,01e+07
Taxable Income	19,105.33	35,361.59	0	4,86e+07
Deduction for main residence	211.62	369.20	0	33,554
Pension allowances	472.96	20,135.34	0	418,987
Gross tax liability	5,165.99	14,463.33	0	2,09e+07
Total tax credits	1,620.33	1,112.03	0	290,792
Net tax liability	3,724.40	14,401.99	0	2,09e+07
Bonus 80 euro	148.90	257.00	0	640

Note: data are referred to the fiscal year 2014.

Table 2. Reynolds-Smolensky decomposition, Italian macro-areas

AREA	No Bonus 80 Euro				
	Tax Schedules	Tax Credits	Deductions	Re-ranking	R-S Index
North-West	0.4501	0.5553	0.0082	-0.0136	1.0000
North-East	0.4114	0.5931	0.0109	-0.0154	1.0000
Centre	0.4088	0.5880	0.0184	-0.0152	1.0000
South	0.2816	0.7190	0.0171	-0.0177	1.0000
Italy	0.3806	0.6284	0.0123	-0.0213	1.0000
AREA	Yes Bonus 80 Euro				
	Tax Schedules	Tax Credits	Deductions	Re-ranking	R-S Index
North-West	0.4225	0.5842	0.0077	-0.0144	1.0000
North-East	0.3855	0.6204	0.0102	-0.0161	1.0000
Centre	0.3845	0.6140	0.0173	-0.0158	1.0000
South	0.2691	0.7342	0.0164	-0.0197	1.0000
Italy	0.3592	0.6523	0.0116	-0.0231	1.0000

Note: Values expressed as percentage of the total Reynolds-Smolensky Index.