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Institute of Economics
Scuola Superiore Sant'Anna

Piazza Martiri della Libertà, 33 - 56127 Pisa, Italy
ph. +39 050 88.33.43
institute.economics@sssup.it

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A New Geography of Inequality: Top incomes in Italian Regions and Inner Areas

Demetrio Guzzardi [1]
Salvatore Morelli [2]

[1] Institute of Economics and L'EMbeDS, Scuola Superiore Sant'Anna, Pisa, Italy
[2] University of Roma Tre and Stone Center GC-CUNY, New York, USA

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Demetrio Guzzardi[1] and Salvatore Morelli[2,3]

[1]Institute of Economics and EMbeDS, Scuola Superiore Sant'Anna, Pisa, Italy
[2]University of Roma Tre - Law Department, Rome, Italy
[3]Stone Center on Socio-Economic Inequality, GC-CUNY, New York, United States

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Abstract

Detailed distributional estimates at finer geographical levels remain scarce, despite their critical relevance for household well being and policy intervention. This paper leverages Italian income tax records dating back to 1976 focusing on top income concentration and inequality across the country's regions, macro-areas, and the recently introduced classification of the National Strategy for Inner Areas (SNAI). Our analysis reveals a persistent rise in income concentration over the past few decades, particularly among the top earners, while also highlighting nuanced regional and sub-regional dynamics. Notably, city size plays a crucial role, with larger cities experiencing a more pronounced level of income concentration compared to smaller ones. Southern regions exhibit lower income concentration levels among the top income groups, emphasizing the need for disaggregated analyses to capture these complexities accurately.

Keywords: Income Inequality; Top Income Shares; Italy; Inner Areas; Spatial Inequality; Income Tax Data; National Accounts.

JEL classification: D31 · H20 · J3 · R1

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Email: demetrio.guzzardi@santannapisa.it ; salvatore.morelli@uniroma3.it.

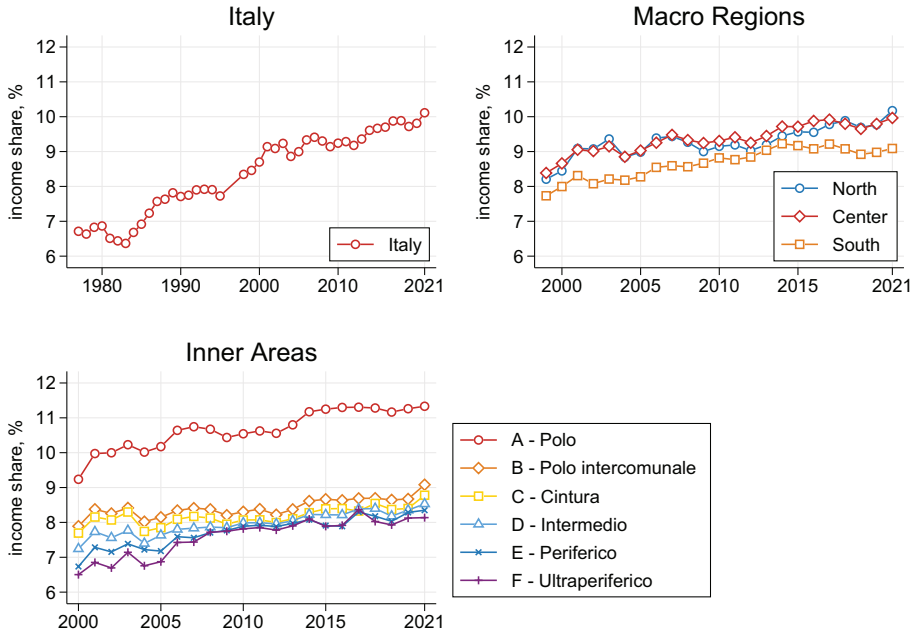
1 Introduction

The study of national income distribution and inequality has a long tradition in economics. Yet, distributional estimates at disaggregated geographical levels are rarely available despite their growing role along, at least, two main dimensions. First, spatial dimensions of inequality are increasingly important in shaping the well-being and life opportunities of citizens and families (Chetty et al., 2016; Connolly et al., 2019) as well as the social cohesion between and within territories. Such territorial economic disparities are increasingly important in shaping voting behaviour and political participation too (Kanbur and Venables, 2005; Rodríguez-Pose, 2018; Dijkstra et al., 2020). Second, spatial dimensions of inequality are crucial to understanding the societal impacts of the unfolding climate shocks and extreme climatic events which are often highly localized and require more granular information at the local level.

This paper provides new insights into the spatial dimensions of top income concentration and income inequality in Italy for the first two decades of the twenty-first century, offering valuable information for Italian regions, macro-areas, and the recent institutional classification of the 'National Strategy for Inner Areas' (SNAI). The latter geographical unit classifies municipalities depending on their proximity to access to essential public services, such as health and education. Our paper complements recent efforts to use this classification for income inequality studies (e.g. see the works by Mastronardi and Cavallo, 2020; Gallo and Pagliacci, 2020). Data series on provinces and Italian municipalities are also produced and made available through our publicly available data. We also builds new income concentration estimates for Italy as a whole for a longer time span, beginning from 1976. In doing so, we refine existing research for studying income concentration in Italy by utilizing Italian income tax records (e.g. Alvaredo and Pisano, 2010), including adjustments to account for unreported income and missing adult population, and aligning fiscal income definitions with Italian income legislation.

The main findings underscore a persistent increase in income concentration in Italy regardless of income definition, group, or geographical classification (see Figures 1 and 3). The analysis reveals a substantial surge in real income for top earners (with the top 0.1% nearly quadrupling their real income since 1976), contrasting with modest growth for the bottom 90%. Changes in income composition over time show a doubling of the relative importance of financial incomes for the top 0.1%. While the Southern macro area appears the most unequal for the top 10%, examination of the top 1% or top 0.1% reveals a different pattern, with Southern regions displaying lower income concentration levels. This highlights the importance of scrutinizing upper-income groups individually to capture nuanced regional dynamics. The use of the National Strategy for Inner Areas (SNAI) which classifies each municipality into 6 different categories according to the accessibility to essential public services available to the citizens also reveals interesting find-

Figure 1: Top 1% income share



ings. While most municipalities show similar inequality levels, city size plays a crucial role, with larger cities experiencing a more pronounced level of income concentration compared to smaller ones, which align more closely with other peripheral areas. It is worth noting that examining the share of total income across macro-areas or aggregation of municipalities hides significant income differentials across geographic areas. For instance, while one needs at least €515,275 to enter the richest 0.1% group in the North, the threshold is at €160,230 in the South & Islands. This territorial heterogeneity in average income implies that different regions, macro-regions, and areas cannot be equally represented in upper-income brackets when defined at the national level, with Northern regions and larger cities disproportionately represented compared to the South and peripheral municipalities.

Following the existing literature on income inequality using income tax data we have focused mostly on the upper end of the income distribution (Atkinson, 2007; Atkinson et al., 2011; Alvaredo et al., 2016; Blanchet et al., 2022; Blanchet et al., 2022). Nonetheless, the use of flexible Generalized Pareto interpolation techniques (Blanchet et al., 2022) also allows interested users to use public data files to gather results on other fine-grained income groups. Research on income inequality has predominantly pursued three primary avenues, determined by the available methodologies and data sources. These include examining survey data, tax data, and a recent

method known as Distributional National Accounts (DINA), integrating various distributional statistics with National Accounts data. Most studies have relied on household survey data, providing a comprehensive view of income distribution and utilizing various income concepts such as market, gross, and disposable income. However, these studies often face challenges like low response rates at the top of the income distribution (see Carranza and Nolan, 2022 for an up-to-date and thorough discussion). Other works have focused on Tax data analysis. This method, pioneered by Kuznets and Jenks (1953) for the US, and, more recently, by Piketty (2003); Piketty and Saez (2003); Atkinson (2005) for France, the US, and the UK, involves using income tax data to estimate top income shares. While providing long-term data and detailed geographic breakdowns, it has limitations such as underreporting and differences in tax systems among countries. The newer DINA approach aims at measuring income inequality by integrating various data sources, including tax data and surveys, and ensuring compatibility with National Accounts. DINA-based series allow for more compelling cross-country comparisons as they are based on more standardised income definition across different countries and time periods. However, depending on data availability, this methodology may rely on proxies to recover the distribution of some income sources whose distributions are not fully known.

The paper diverges from conventional survey-based or DINA approaches (here the interested readers can refer to the work of Guzzardi et al., 2023 for the case of Italy and Blanchet et al., 2022 and Ederer et al., 2022 for an EU perspective) and instead aligns with the income tax data literature, drawing parallels with prior studies such as Atkinson (2007) and Alvaredo and Pisano (2010). In doing so, it tackles a number of challenges. Firstly, it discusses the incomplete coverage of tax returns with respect to the adult population, attributing it to various factors such as exemptions, non-filers, and unlawful non-disclosures. Then, using data from the National Accounts, we estimate the unobserved wage, pension, and self-employment incomes which are distributed to the population and assumed to be concentrated among individuals within the bottom 90% of the income distribution. Capital incomes pose a challenge due to their low coverage rate in tax data. This led to a conservative choice of retaining the distribution as per tax records. Likewise we do not impute the evaded portion of the self-employed incomes which would require more precise distributional information which we do not possess. Hence, the measure of total income used in this paper is estimated consistently with this choice and will exclude the portion of self-employed income that is evaded and the portion of capital and investment incomes that are not reported in the tax data. Lastly, we employ the generalized Pareto interpolation method to interpolate income ranges within tabulated data, allowing for the estimation of income shares, averages, and thresholds for precise percentiles. This method ensures a smooth curve over the entire income distribution while maintaining consistency with the available tax tabulations' quantiles and means.

Our work contributes to the literature on income distribution in several ways.

First, our study provides a novel geographical decomposition of income inequality contributing to a more recent interest in spatial income inequality (Bauluz et al., 2023; Disslbacher et al., 2024). By utilizing regional tax tabulations, we can analyse the distribution of income at the macro-regional level (i.e. North, South, Center) as well as for each of the 21 Italian regions. Using municipal tax tabulations and a similar methodology, we also compute inequality measures for the entire universe of Italian municipalities spanning from 2000 to 2021. In particular, we present inequality statistics using the novel institutional classification of the so-called National Strategy for Inner Areas ('Strategia Nazionale Aree Interne - SNAI') that categorizes municipalities according to their proximity to key essential public services (such as healthcare, education, public transport, etc.). This taxonomy divides municipalities into 6 different classes, ranked from *A* to *F*, with class *A* representing those closest to all fundamental public services, and class *F* representing those farthest away (see Section 3.3). In the context of Italy, Alvaredo and Pisano (2010) pioneered the utilization of Italian tax return data. Since then, the use of taxable reported income has gained consensus in Italy and a few studies have also provided geographically dis-aggregated estimates of income inequality. However, these studies focused on aggregate inequality indexes, such as the Gini or the Theil indexes (not top income shares), and have failed to incorporate any form of adjustments for unreported income from individuals below the reporting threshold and have overlooked the need to consider the total adult population when examining the top of the income distribution (Acciari and Mocetti, 2013; Di Caro, 2017). Estimates of these kinds are limited as they are merely inequality measures of reported incomes among tax filers, not inequality measures of total income among the adult population.[1]

Third, in our main analysis, we move beyond the fiscal income concept and construct top income shares based on several income definitions to allow for a nuanced examination of income dynamics and distribution patterns. The paper adopts a 'benchmark' definition of income, which is gross income minus all social security contributions, akin to spendable income before taxes. It also explores four additional income definitions to provide a comprehensive analysis. Firstly, 'post-tax' income is derived by subtracting all personal income taxes paid from the benchmark definition. Then, a definition of 'market income' is constructed, encompassing financial and rental incomes, labor incomes with social security contributions and taxes, excluding pension incomes and monetary benefits. Lastly, concentration measures are based on a 'gross income' definition, including market incomes and government cash transfers like old age pensions.

[1] We also compare all our estimates to those obtainable with raw tax tabulations without any correction for the total population and without using an external total income (Figure E.3). In this case, estimates refer to the share of total reported income by a specific proportion of the tax-filers. This is not a meaningful population inequality statistic but it is worth noting the trend for top income shares derived with this approach would be comparable until the beginning of the century but will differ substantially for the last 20 years, with a flatter trend over time.

Finally, we refine Alvaredo and Pisano (2010)'s methodology to estimate income shares by constructing a fiscal income definition that aligns more closely with Italian income legislation. The fiscal income definition closely mirrors tax reporting, incorporating wages net of social security contributions, pensions, self-employed income before SSC, and capital income declared in personal income tax forms. Our series is also derived using the flexible Generalized Pareto interpolation (Blanchet et al., 2022) instead of the Pareto interpolation, as used in Alvaredo and Pisano (2010). Our changes only slightly alter the concentration of fiscal income at the top of the distribution, and the overall trend remains comparable (see Figure E.3).

The remainder of this paper is organized as follows. In Section 2 we will discuss the details of the methodology (Section 2.2), the income concepts (Section 2.3), and the data used (Section 2.4). In Section 3 we show our results on top income shares at various geographical levels of detail, starting from the National level then the macro-regional estimates and finally the municipality estimates aggregated following the SNAI taxonomy. In Section 4 we move to analysing income growth incidence curves at the National and macro-regional level (Section 4.1) that influence the increase in income concentration, and Section 5 analyse the income components by showing how they fit in the national and macro-regional context (Section 5.1). Finally, Section 6 concludes.

2 Methodology, Income Concept and Data Sources

2.1 Existing approaches

The literature on income inequality has largely followed three main streams of analysis, depending on the nature of methodologies and data available, namely tax data analysis, survey data, and a newer approach called Distributional National Accounts (DINA), which leverages all distributional statistics available together with National Accounts information, offering a comprehensive approach to analyzing income distribution.

First, the most widespread research has focused on household survey data relying on information declared by household respondents following a structured interview can generally focus on all (e.g. see the works by national and international institutions as official statistics on inequality (OECD, 2015; Di Meglio et al., 2018; Istat, 2019) or research focused on Italy, using the Survey of Household Income and Wealth administered by the Bank of Italy, (Brandolini and Smeeding, 2011; Cannari and D'Alessio, 2002; Brandolini, 2008; Brandolini et al., 2018; Jappelli and Pistaferri, 2010; Checchi et al., 2023; Manna et al., 2012; Ciani and Torrini, 2019). The main advantage of this approach is the availability of a rich set of covariates, the coverage of the overall population, as well as the possibility to rely on a sound and theoretically grounded definition of income. As recalled in Carranza and Nolan (2022) studies of income inequality using survey data have

generally focused on three main income concepts: market, gross, and disposable income. Market income represents all income flows before the State has made any intervention, typically including wages and capital income. Gross income adds transfers and benefits to market income, while disposable income deducts direct taxes and social insurance contributions from gross income. Nevertheless, all these works use only the income reported on the survey without any additional adjustment to account for the low response rates at the top of the distribution. In the presence of growing income inequality this could be problematic (see Ravallion, 2022; Alvaredo et al., 2022; Blanchet et al., 2022).

The second most widespread method to study income concentration stems from the use of income tax data pioneered by Kuznets and Jenks (1953) for the US, and, more recently, by Piketty (2003); Piketty and Saez (2003); Atkinson (2005) for France, the US, and the UK.[2] Subsequent studies across several countries have emerged in the field of inequality that use tax data to estimate top income shares (Piketty, 2003; Saez and Veall, 2005; Dell, 2005; Atkinson, 2005; Nolan, 2007; Atkinson and Leigh, 2007; Salverda and Atkinson, 2007; Moriguchi and Saez, 2006; Roine and Waldenström, 2010; Alvaredo and Pisano, 2010; Souza and Medeiros, 2015; Advani et al., 2021; Krolage et al., 2022). The general approach of this methodology is to define the aggregate income from external statistics and compare it with the amount reported by top income earners (Atkinson, 2007). Adjustments to reported incomes may also be applied. In this way, it is possible to calculate fiscal income shares for the top income earners. However, the differences in the fiscal system among countries make such estimates intrinsically unsuitable for cross-country comparison. The advantage of this methodology is that by focusing on tax data, it is possible to obtain inequality estimates for an extended period, often since the beginning of the taxation of income. Moreover, geographical information is often associated with tax records, enabling a more detailed geographic breakdown of income inequality metrics. However, this advantage comes at a cost. Tax data inherently cover only the income declared to tax authorities by individuals who file tax returns. Consequently, the total reported income may deviate from the total income stated in National Accounts, often by sizeable amounts. This disparity arises because not all earned income needs to be reported on tax returns, not all individuals are obligated to file tax returns, and some might understate their income intentionally for tax evasion reasons.

Thirdly and finally, the most recent strand of literature starts with the seminal paper of Piketty et al. (2018) proposing a new approach to income inequality measurement, the so-called Distributional National Accounts (DINA) approach. By using several data sources including tax data and surveys, this new methodology aims at deriving inequality measures which are fully compatible

[2] The approach was also used by Feenberg and Poterba (1993) in the US. Subsequently estimates of top income shares time series over the long run for more than twenty countries using income tax statistics were derived in a multi-country collaboration project described in the work by Atkinson and Piketty (2007) in Atkinson et al. (2011) and in the so-called World Top Income Database (WTID)

with the Net National Income (NNI) totals as available in the National Accounts (NA).[3] This implies distributing income at the individual level, encompassing not only the income directly earned by households but also the retained earnings of companies and other income components not earned directly by households. The primary advantage of this approach lies in the ability to compare income inequality across countries through the use of National Accounts (NA). NA data are constructed using consistent international standards, ensuring that any inequality statistics derived from them are inherently suitable for cross-country comparisons. Moreover, this method provides a higher degree of consistency in defining income across different countries and over time. As recalled in Carranza and Nolan (2022), the "DINA framework assigns a central role to the following income variables: Pre-tax national income: the sum of all factor income flows, before considering the operation of the tax and transfer system, but after considering the operation of the pension and unemployment insurance systems; Post-tax national income: pre-tax income after subtracting all taxes and adding all forms of government spending."

2.2 Our Methodology

Our paper neither adopts a survey-based approach, nor a DINA approach. Instead, the paper follows, broadly speaking, the income tax data literature. In particular, as in Atkinson (2007); Alvaredo and Pisano (2010) we identify the top income earners from tax tabulations and divide it by the comparable income earned by the whole population (from external and independent sources) to calculate their income shares. There are four main challenges to overcome.

First, tax returns only cover a portion of adult individuals. Individuals may be left out because they have no income to declare (e.g. students, unemployed, etc.), have too little income to declare (e.g. individual earners with total income below the tax exemption threshold), their income is non-taxable (e.g. doctoral, postdoctoral researchers or recipients of education grants).[4] Individuals who chose, unlawfully, not to declare any income will also not appear on income tax statistics. The difference between the number of Italian adults aged 18 years old or older, as recorded by the Italian Statistical Office (Istat), and the number of adult tax filers is approximately 10 million individuals. For our exercise, we assume that this portion of individuals belongs to the bottom 90% of the population. We effectively treat the latter as our lowest income group.

The second challenge concerns the estimation of total income. To do so, we rely on sources

[3] As detailed in Alvaredo et al. (2020) the main difference between NNI and GDP lies in the fact that to obtain the NNI one has to subtract from GDP the income that is estimated to be lost due to the depreciation of the capital stock (i.e. consumption of fixed capital) and add the net foreign income (i.e. income generated abroad accruing to domestic residents, minus the income generated in the domestic economy accruing to foreigners).

[4] Different sources of income, such as most of capital and investment incomes, are not subject to income tax but a separate proportional tax. Although this may be an unlikely hypothesis, adults may not appear in the statistics also if their sole source of income is subject to a withholding tax.

that are mostly external to tax data, such as the National Accounts. This procedure would implicitly include the income from non-filers. As detailed in Appendix A, we first sum the total wage, self-employment (without tax evasion), business, and pension incomes from the National Accounts. As for capital incomes, we do not rely on external data but rather we use total capital incomes as reported on tax data (similarly to what is done in Alvaredo and Pisano, 2010). As explained in Appendix A, whereas wage, pension, and self-employed incomes declared on tax data are very close to National Accounts total, the coverage rate for capital incomes is lower than 10%.[5] Such a low coverage rate, and absent other detailed information, would make any distribution of the unobserved income very challenging and open to substantive objections. We then opted to preserve the distribution and the total amount of capital incomes as represented within the tax records.

The third challenge concerns the imputation of unobserved income. Abstracting from the coverage issue of capital and investment incomes, we observe that the difference between the total income on tax records and the external income totals, as described above, has been very small in recent years. The gap is, however, wider in the earlier period up to 2000. In our exercise, we assume that the unobserved wage and pension incomes are assumed to be originating from individuals within the bottom 90%. We adopt the same assumption for the unaccounted portion of self-employment income, excluding the portion that is assumed to be evaded income in the National Accounts. This should not result in a stringent assumption, as we are addressing a portion of income likely concentrated among low-income individuals (i.e. incomes falling below the tax exemption threshold). On the contrary, we do not impute unobserved capital incomes as well as the evaded portion of the self-employed incomes. This exercise would require more precise distributional information about such income components which we do not posses and, likewise, a full re-ranking of individuals following the imputation which cannot be carried out convincingly using tabulated data.

Finally, the last challenge, implies the interpolation of the income ranges within tabulated data to derive income shares, averages, and thresholds for precise percentiles we are interested in estimating. To this end we will make use of the generalized Pareto interpolation method developed by Blanchet et al. (2022). This method is based on calculating the inverted Pareto coefficient $b(p)$ as the ratio between average income above rank p and the p-th quantile, for each available bracket in tax tabulations. Then, it performs quintic-spline interpolation and a few other ad-hoc constraints to obtain a distribution that matches the quantiles and the means of the tax tabulations and at the same time allows for a smooth curve over the whole income distribution.

[5] This is due to the existing withholding tax on most capital and financial incomes which limit substantially what the tax data can say about these sources of income.

2.3 Income concept

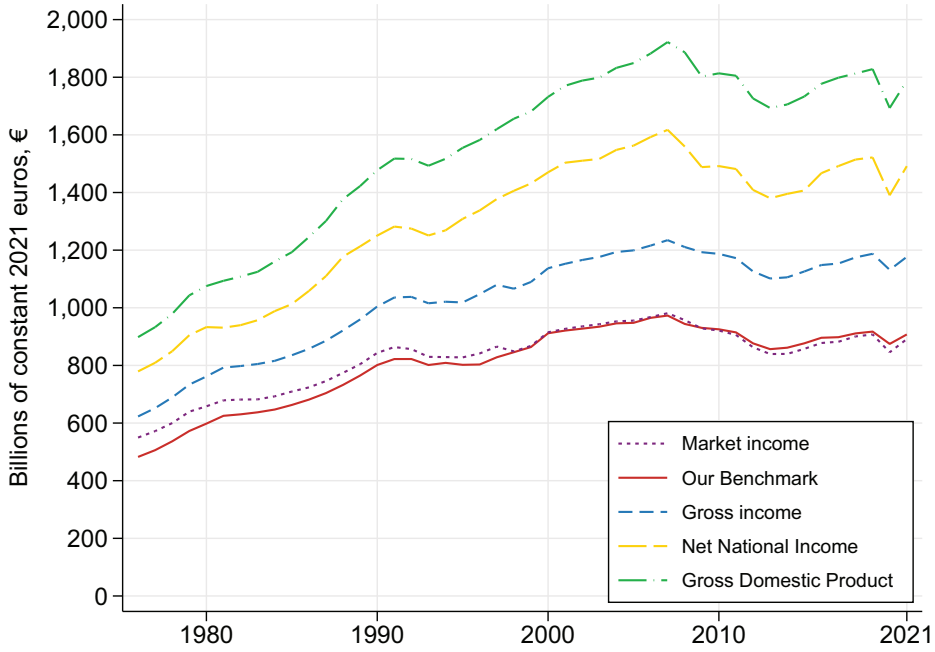
As recalled in Carranza and Nolan (2022) the measurement of income inequality typically looks at three main income concepts: market, gross, and disposable income. Market income represents all income flows before the State has made any intervention, and generally include all labour and capital incomes. Gross income adds transfers and monetary benefits and pensions to market income, while disposable income deducts direct taxes and social insurance contributions from gross income.

The *benchmark* definition of income we use in our paper is gross income deducting all social security contributions (SSC). This would come closer to a definition of spendable income before taxes (or 'pre-tax income' according to the DINA methodological guidelines with the exclusion of the undistributed profits of corporations to household incomes). No adjustments are needed for wages which are typically reported net of SSC and gross of taxes. However, ordinary self-employed income is reported gross of SSC, and since 2015 self-employed income in preferential tax-regime is reported net of SSC and net of the proportional income tax paid. We thus adjust these income sources by estimating the SSC due in both ordinary and favourable self-employed income regimes and the proportional income taxes paid by those in the favorable tax regimes.[6] We also consider four additional definitions of income. First, a 'post-tax' income is defined as the benchmark definition subtracting all personal income taxes paid (no other taxes are subtracted). Then a definition of 'market income' is constructed as the sum of all financial and rental incomes present in the income tax returns, the sum of all incomes from labor gross of all social security contributions and taxes paid, but excluding pension incomes and any monetary benefits received from the government. Third, we derive concentration measures based on a 'gross income' definition defined as the sum of all market incomes and including all government (taxable) cash transfers, such as old age pensions. Finally, we consider a 'fiscal' income definition that follows tax reporting closely (i.e. income that is or should be reported on income tax declarations before any specific deduction allowed by fiscal legislation). Such definition includes wages net of social security contributions (SSC), pensions, self-employed income gross of SSC, and the capital income declared through the personal income tax forms.

Figure 2 represents the difference of total incomes following all definitions used in the paper. Moreover, it shows the difference between all income concepts used in the paper and two important income indicators from the National Accounts, namely the Net National Income (NNI), and the Gross Domestic Product (GDP). Both totals of market income and the benchmark income are close to one another because SSC and pensions almost balance each other out. However, the distributional impact of these two income components is significantly different as they

[6] Further details are available in Appendix A.2.

Figure 2: Total income concepts



depend on who earns SSC and who receives pensions. Total gross income is considerably higher than our market income and benchmark income totals since it includes both the SSC and the pensions. It is also worth dwelling on the large gap between NNI and total market income in view of the relevance that the NNI definition plays within the recent development of the so-called DINA literature (Alvaredo et al., 2016). Such gap has several explanations linked to conceptual income differences between tax records and National Accounts. First of all, the NNI definition includes an estimate of evaded incomes of the self-employed which is naturally unreported on tax records. Likewise, mostly due to the existence of a withholding tax on capital incomes, only between 3% to 8% of the financial income figures from NA are observed in the tax records (see Figure A.4 in the Appendix). These two components, the financial income and the evaded income of self-employed, account for 15% and 17% of the discrepancy with NNI, respectively.[7] The estimate of imputed rents of the household sector (i.e. the figurative rental income accruing to home owner-occupiers), are also excluded from our definition of income whereas they appear within NNI and account for 3% of the total discrepancy. The rest of the gap between the market income and the

[7] To avoid making rough assumptions about their distribution (even less convincing across all geographical breakdowns of the data), we decided to exclude the portion of financial income that is not present in the tax return (i.e. the external total we use relies on financial incomes that are reported on tax records). For similar reasons, we exclude from the analysis all the self-employed income that is estimated to be evaded.

NNI is due to income sources not earned directly by the household sector. In particular, in 2021, 35% of the gap was due to the retained earnings of the corporation sector, and the remaining 30% was due to income directly earned by the government sector (see Figure D.5).

2.4 Data sources

To construct our long-run income concentration series we rely on several data sources. Income distribution information is mainly obtained through detailed income tax tabulations for different geographical units of aggregation. Each tabulation includes information about the frequency of taxpayers and the total income declared for each income bracket. Information about the composition of income and the effective income liability is often available too.

Income tabulations at the national and regional levels are available from 1974 to 2021 and from 1999 to 2021, respectively, and present a relatively high number of income brackets, 33 or 34 depending on the year. Tabulations also provide a detailed decomposition of total reported income that we grouped into six main income categories for each income class: employed, self-employed, pension, actual rents, and financial incomes.[8] At the national level, income composition is only available since 1976. Income tabulations at the municipality level have been publicly available since 2000 but differ significantly from national and regional ones in two important ways. First, to preserve a higher degree of data privacy of public records, only 7 or 8 income brackets are available, depending on the year. Consequently, the limited number of brackets available at the municipal level necessitates more extensive interpolation within the data. As a result, the focus of our analysis will never extend beyond the richest percentile (i.e. Top 1%) at the municipal level. Secondly, the municipality tabulations do not provide any breakdown of income sources within income ranges, which restricts our analysis on this dimension at fine geographical disaggregation (see Appendix B for further details).

In the estimation of our different measures of total income needed to estimate income shares (see Section 2.2) we rely on National and Regional Accounts released by the National Statical Office, Istat, and retrieve information on wages, self-employment income, and social security contributions. Pensions and other taxable transfers are obtained from the National Institute for Social Security, INPS. To obtain estimates of total gross income, market income, and our benchmark income definition at the municipality level, we require estimates of the missing incomes. To do so, we assume that the proportion between declared income and total income is homogeneous across municipalities within each region and equal to the proportion observed at the

[8] We generally refer to the IRPEF tax tabulations available on the Ministry of Economy and Finance website https://www1.finanze.gov.it/finanze/pagina_dichiarazioni/public/dichiarazioni.php. However, it should be noted that National tabulations from 1976 to 2002 were obtained from the publication of Alvaredo and Pisano (2010), while Regional tabulations from 1999 to 2015 were kindly provided by the Ministry of Economy and Finance.

regional level where external totals can be retrieved from National Accounts (see Appendix C for further details).

Finally, data on the adult population up to the municipality level is sourced from the Istat population census.

3 Top income shares at National and Sub-National level

In this section, following the methodology outlined in Section 2.2, we show our estimates on income concentration by first focusing on the national level in Section 3.1 showing results for our three main incomes discussed in Section 2.3. Then in Section 3.2 we split the nation into three main macro-areas, North, Center, and South & Islands, and show our results for the income concentration of our benchmark income definition at the macro-region level. Differences between income concentrations among regions are also discussed. Finally, in Section 3.3 we present our main results on income concentrations using municipality-level data aggregated according to a policy classification criteria used within the National Strategy for Inner Areas (i.e. *Strategia Nazionale Aree Interne*), identifying areas according to their accessibility to essential public services such as health, education, mobility, etc.[9]

3.1 Top income shares in Italy

Our analysis begins with the estimation of top income shares at the national level. In Figure 3, we present our key findings, depicting top income shares for three distinct income brackets: the top 10%, the top 1%, and the top 0.1%. While all subsequent analyses are based on our benchmark income definition, we begin by showing estimates for all the four main income concepts defined in Section 2.3: benchmark income, gross income, market income, post-tax income.[10] Estimates based on fiscal income (i.e. income as reported on tax records with minor adjustments) are not shown in Figure 3 and are effectively an extension and update of the existing estimates from Alvaredo and Pisano (2010) and discussed separately within Appendix A.4.[11]

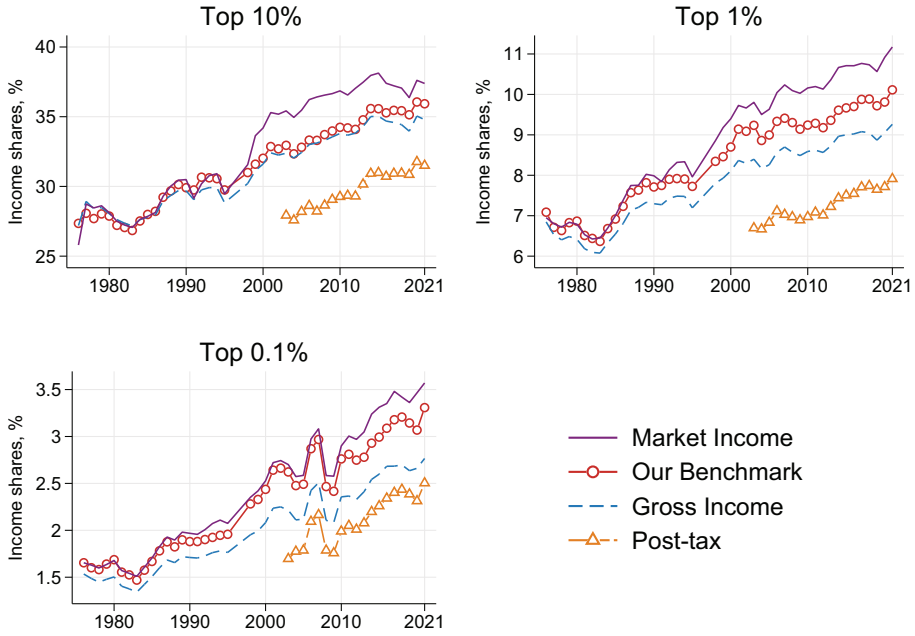
Our main findings reveal a persistent, long-term rise in income concentration in Italy, regardless of the income definition employed. The top 10% experienced a substantial rise, expand-

[9] The data files associated with this paper contain full income share estimates at the municipality, province, and regional levels for all years and many percentiles in the distribution.

[10] Recall that the market income concept encompasses all earned income and social security contributions while excluding received taxable pensions. The gross income concept adds taxable pensions to the market income, whereas our benchmark definition deducts social security contributions from the market income and includes all taxable pensions received. Our post-tax income series is obtained from our benchmark estimates from which we subtract all the effective income taxes paid.

[11] Our findings show similar trends with Alvaredo and Pisano (2010), with the top 10% of income earners increasing their share of total income by almost 10 pp since 1980.

Figure 3: Top Income shares



Note: "Post-tax" is calculated subtracting the personal income taxes paid from "Our Benchmark"

ing their income share by at least 7 percentage points (pp) – climbing from 27% of total income to over 35% in 2021. Similarly, the top 1% saw their income share fluctuate, starting at 7% in 1976, dipping slightly in subsequent years, then steadily climbing to 10% of our benchmark income definition and reaching 11% when considering the market income concept. Examining the top 0.1%, a consistent upward trajectory is also evident, with their income share rising from just above 1.6% in 1976 to a historical peak after the Covid-19 pandemic in 2021, where they earned 3.3% of the total income (see Table D.1 for a precise tabulation). This trend underscores the sustained increase in income concentration within this top income group, only temporarily affected by significant income reduction during the dot-com bubble in 2001 and the Global Financial Crisis around 2008 (refer to Section 4 for additional discussion).

Notably, the market income definition reveals the highest concentration levels and the most marked rising trend, whereas the gross income definition shows lower top shares and less pronounced growth in the top shares. This contrast arises because in the market income definition, we exclude all types of pensions accruing to the oldest individuals, resulting in an important reduction of income for those at the lower and middle end of the income distribution where pensions are more common. This implies higher income concentrations at the top of the income distribution where pensions are less relevant. On the other hand, the gross income definition

includes pensions, thereby reducing the overall levels of income concentration. Our benchmark series of top income shares fall in between the income shares calculated using the market income definition and the gross income definition. The exclusion of social security contributions from the gross income definition is, indeed, increasing income concentration. This shift is driven by two factors. Firstly, individuals at the top of the income distribution obtain a larger portion of their income from sources like rents and financial assets, which are not subject to social security contributions. Secondly, there is an upper threshold on social security contributions, meaning that individuals earning labor income exceeding (approximately) €100,000 are no longer contributing.

The post-tax top shares estimates show the lowest levels of income concentration among all estimated series but similar trend dynamics. For instance, the top 1% is approximately 2 percentage points below the benchmark series. This is the result of the strictly progressive nature of the Italian personal income tax, implying higher effective tax rates as income rises.[12] However, it's noteworthy that the degree of progressivity appears to have diminished over time. While such direct personal income taxes effectively reduced the top 10% income share by 5 percentage points (pp) in the initial available year of 2003, this reduction steadily decreased to 4.4 pp by 2021. Similarly, for the top 1%, the impact of personal income taxes on income share reduction declined from 2.5 pp in 2003 to 2.2 pp in 2021. The reduction was less pronounced for the top 0.1%, decreasing from 0.9 pp in 2003 to 0.8 pp in 2021.

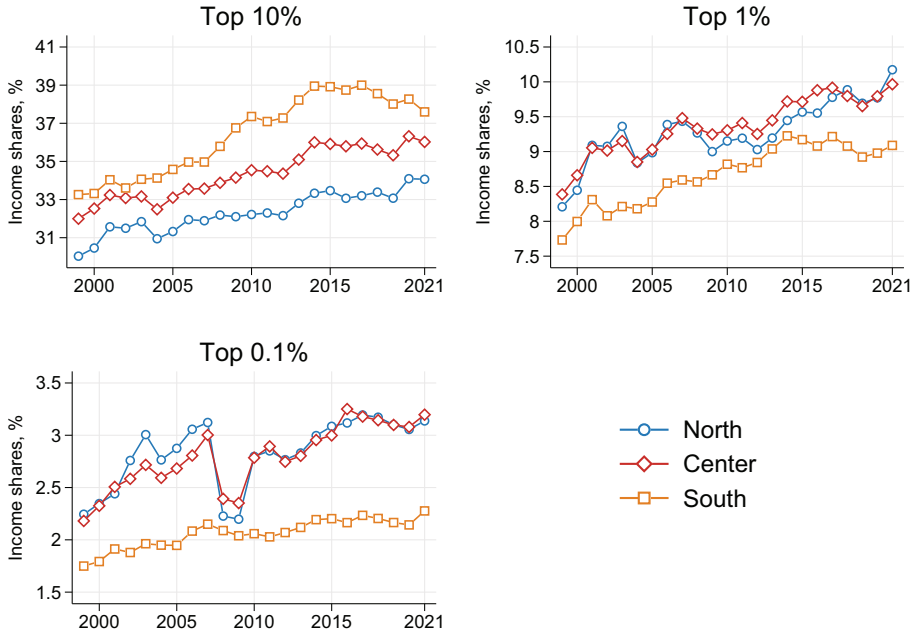
3.2 Top income shares at sub-national level

Regional economic disparities in Italy are large in terms of income levels, growth, capital accumulations, and welfare (Istat, 2021a,b; OECD, 2019). North-South economic divides are a widely researched topic even in economic history, as such divides date back even to the pre-unification period of the nation (Felice, 2018; Federico et al., 2019). Our work also contributes to the literature on regional disparities by analysing the dynamics of income concentration at the top within disaggregated sub-national areas.

Figure 4 shows the main results representing the dynamics of income concentration for the South, the Center, and the North areas of the country. The figure shows, in different panels, our benchmark income concentration series for three groups, the top 10%, the top 1%, and the top 0.1%. Focusing on the top 10% alone, the Southern macro area appears the most unequal of the country. The share of total income held by the richest decile is more than 2 percentage points

[12] There are two important caveats to this statement. First, many capital incomes are subject to a separate withholding tax and are often subject to a preferential tax regime compared to personal income tax rates. Second, as shown in Guzzardi et al. (2023), the overall effective tax rate (including all taxes and social security contributions other than the personal income tax) may well be regressive along the income distribution, especially above the 95th percentile of the personal income distribution.

Figure 4: Top income shares, by selected income group and Macro geographical area



higher in the South compared to the North. This confirms previous findings in the literature such as those presented in Güell et al. (2018) which argued that income inequality is higher in Southern regions despite having a lower per-capita income than the Centre and Northern regions. However, the overall picture changes substantially when zooming within the top 10%. The Northern and Central regions now appear to be those with higher levels of income concentration. Upon closer examination of the top 0.1%, we observe a consistent pattern, where the Southern regions displayed the lowest concentration among the three macro areas. This shows the importance of looking more closely within the upper income groups.

It is noteworthy that during the Global Financial Crisis, the top 0.1% experienced a decline in income share, but although this decline was attributed to a widespread reduction in all income sources of this income group, it was limited to the North and Center regions. In contrast, the Southern regions did not exhibit a comparable decrease in income share. This anomaly can be explained by the fact that even lower-income groups in those regions experienced a significant real income loss (refer to Section 4.1 for further details). This confirms the importance of looking within the top decile and documenting the dynamics for the upper income brackets (for complete income shares tables at the regional level see Appendix D Table D.2, D.3, D.4).

Results are also derived for the two alternative income definitions, market income as well as

Table 1: Thresholds and Average income for top income in Macro Regions in 2021

	North		Center		South		Italy	
Income group	*Threshold*	*Average income*	*Threshold*	*Average income*	*Threshold*	*Average income*	*Threshold*	*Average income*
Adult Population		21,944		19,121		12,984		18,249
Top 10%	41,042	74,753	38,635	68,878	30,988	48,818	36,516	65,567
Top 1%	112,836	223,257	102,547	190,537	77,041	118,010	98,120	184,562
Top 0.1%	515,275	688,472	403,028	611,265	160,230	295,627	374,803	603,627

Table 2: Distribution of Macro-regional population in National top income in 2021*

Income groups	*National Threshold*	*North popluation shares*	*Center popluation shares*	*South popluation shares*
Total population	€	46%	20%	34%
Top 10%	36,516€	58%	22%	20%
Top 1%	98,120€	62%	23%	15%
Top 0.1%	374,803€	70%	20%	9%

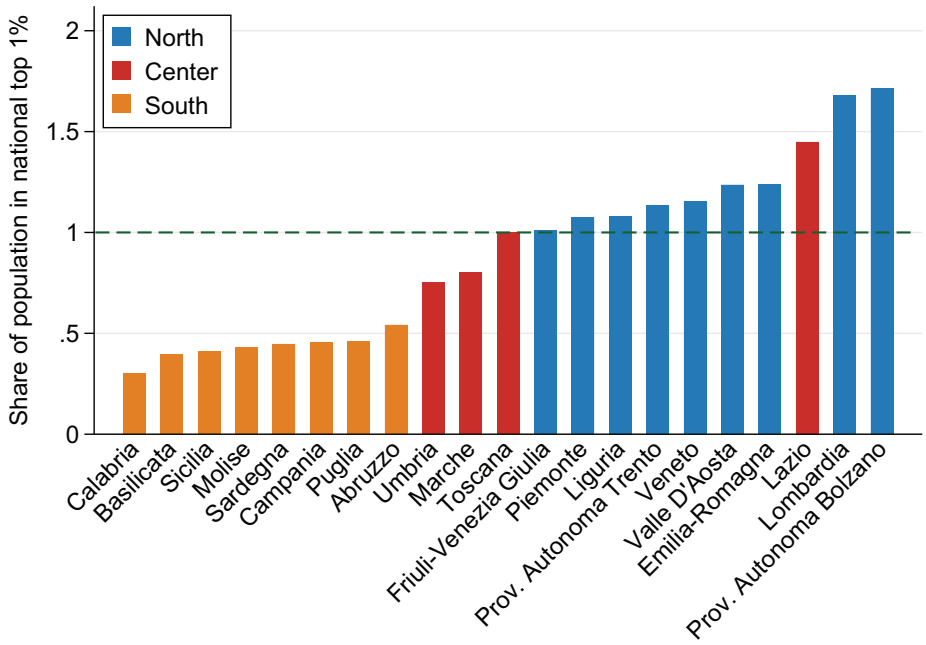
* Note: Thresholds are calculated based on National total income.

gross income. All results are consistent with what derived for the benchmark income definition. One exception is worth noting. When considering measures based on gross income (i.e. market income plus pensions, including all social security contributions), the geographical heterogeneity of income concentration between North, Center, and South is attenuated. In the case of top 1% group, the shares are almost identical in levels and follow a similar trend (Figure E.4).

Looking at the share of total income within different macro-areas provides important information about the distribution of incomes across different areas. However, this exercise hides important income differentials across geographic areas. In Table 1 we show that while in the North of Italy, one needs at least €41,042 to enter the richest 10% group, such threshold is 25% lower of just €30,988 in the South & Islands. On average, the richest 10% of adults living in the North earn €74,753 compared to €48,818 in the South. Climbing further up on the income ladder would widen such disparities even more. To enter the richest 0.1% of adult income earners in the North one would need at least €515,275 compared to €160,230 in the South of the country.

One direct implication of such large territorial heterogeneity in average income is that different regions and macro regions cannot be equally represented in different upper groups of the income distribution when defined at the national level. Indeed, Northern regions are disproportionately represented in the upper income brackets compared to the Southern regions. To illustrate this point, let's take the richest national decile group, defined as adult income earners with at least €36,516 in 2021. Our data show that 58% of individuals in the top decile, live in the

Figure 5: Share of regional population part of the National top 1%



North, and only 22% and 20% live in the Center and Southern regions, respectively. The share of people from the Northern Italy increases to 62% if we take the richest percentile of the national income distribution as the reference point. Zooming in even further, for the richest 0.1% of the national population (those earning at least €374,803 in 2021), we find that only 9% of them live in the South while 71% of them live in the North. Note, that if we were to define the top 0.1% group as the richest 0.1% adults living in the South, the threshold would be €160,230 , more than halved compared to the national threshold. Conversely, the threshold would be much higher, €515,275 if the richest 0.1% would be defined taking the Northern adult population as the reference point. Interestingly, the share of top income living in the Center is on average constant at around 20% regardless of the percentiles we look at (Table 2). We also compute the share of total adults within the regional-specific income distribution that is identified using the threshold of the upper q% group in the national income distribution. Following the discussion above we expect that the threshold of the national top 1% group would identify less than 1% individuals in southern regions and close to or more than 1% in the northern regions. In other words, as shown in Figure 5, the monetary threshold needed to identify the richest percentile in the South would fall short of identifying the richest percentile in the North. Indeed, the monetary threshold identifying the richest national top 1% is only identifying the richest 0,5% in southern regions like Abruzzo or

Puglia. The percentage is higher than 1% for most of the northern regions, where the richest percentile threshold at the national level identifies more than 1% of the richest adults in the region. Similar patterns also apply for the top 10% and the top 0.1% in the Appendix E, Figure E.5 and E.6.

3.3 Top income shares at sub-regional level

Following the methodology described in Section 2.2, we can estimate top income shares, average, and thresholds also at the municipality level consistently with National estimates. In particular, we construct inequality measures aggregating municipalities according to the National Strategy for Inner Areas (SNAI) which classifies each municipality into 6 different categories according to the accessibility to essential public services available to the citizens.[13]

Existing works have used the SNAI classification to derive more standard inequality measures such as the Gini coefficient (Mastronardi and Cavallo, 2020; Gallo and Pagliacci, 2020). However, we believe that looking at more comprehensive income concentration measures in these groups of municipalities may enrich our understanding of these areas and give important insights into the relationship between area characteristics and income inequality, which can inform policy decisions aimed at reducing income disparities.

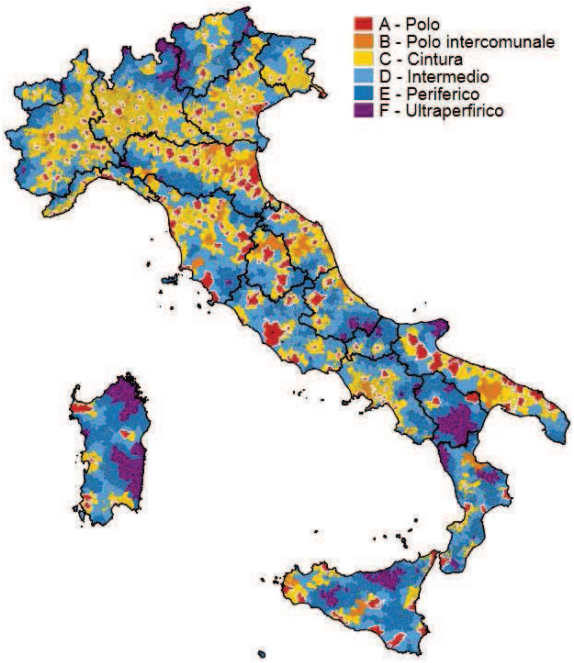
The First group of municipalities is the *A - Polo* category. These are municipalities that offer (i) a complete upper secondary education offer; (ii) at least one "spoke" hospital with emergency rooms and rooms for more complex pathologies;[14] (iii) a railway station with at least 2.500 passengers per day. Then there is the *B - Polo intercomunale*. These are a group of municipalities that can offer the same level of public services as in *A - Polo* within their network of two or more municipalities. The other categories depend on the distance between the closest *A - Polo*. The *C - Cintura* municipalities are located within 20 minutes from the closest *A - Polo*. The other three classifications are *D - Intermedio*, *E - Periferico* and *F - Ultraperiferico*. These are respectively distant from the closest *A - Polo* between 20 and 40 minutes, between 40 and 75 minutes and above 75 minutes. Together, the latter three categories form the *Inner Areas*, while *A - Polo*, *B - Polo intercomunale* and *C - Cintura* groups, are called *Centers*.

In Figure 6 we show the geographical distribution of these municipalities to underlying that it is, by construction, highly correlated with the ease of transportation within that area. The

[13] https://politichecoesione.governo.it/it/strategie-tematiche-e-territoriali/strategie-territoriali/strategia-nazionale-aree-interne-snai/

[14] The use of the Hub & Spoke model in medicine starts from the basic assumption that for certain diseases and/or highly complex situations, it is necessary to have rare specialized expertise and/or expensive equipment, which cannot be widely available throughout the territory. The model therefore involves the provision of care for such situations by regional or macro-area centers of excellence, called "hubs", to which patients from peripheral centers, called "spokes", are referred when the complexity of the expected interventions exceeds what can be provided by peripheral centers.

Figure 6: Geographical location of municipalities by *Inner Areas* classifications

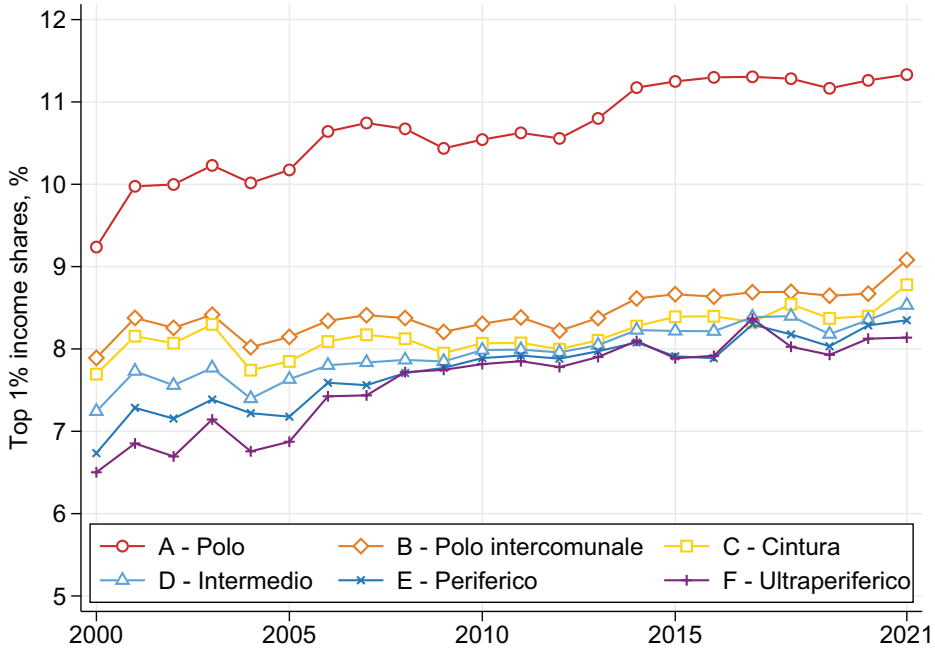


regions of the North with fewer mountains are more populated by Centers municipalities while in the South or extreme North, near the Alpes, Inner Areas are more common.

As we mentioned, Inner Areas are characterized by a lower provision of public services. However, they are also characterized by a substantially lower total population, with only 22% of citizens living in those areas and a significantly lower level of income per capita. All the Inner Areas in 2021 had, in fact, an average income per capita of only €14,963, while in the Centers area, it was 28% higher. Our research revealed that income concentration is not necessarily higher in the most peripheral and poorer cities. In fact, five out of six groups of the municipalities showed similar levels of inequality, with the top 1% ranging between 7% and 9% in the past 20 years. However, there was a notable exception to this trend in the *A - Polo* municipalities. In 2000, the top 1% in *A - Polo* earned 9.7% of the total income and steadily increased to above 11% in 2021 marking an overall speed in concentration considerably faster than all other municipalities. On the other hand, we also found that the top 1% in *Inner Areas* showed a faster concentration rate from 2000 to 2006, which quickly reached a concentration share close to 8% of the overall income in these areas, similar to what we estimated for *B - Polo intercomunale* and *C - Cintura* (Figure 7).

Nevertheless, not all municipalities in *A - Polo* share the same level of inequality. The size of the city is a key factor in determining inequality, with larger cities subject to higher levels of inequality. These cities experienced a more drastic increase in income concentration for the top 1%

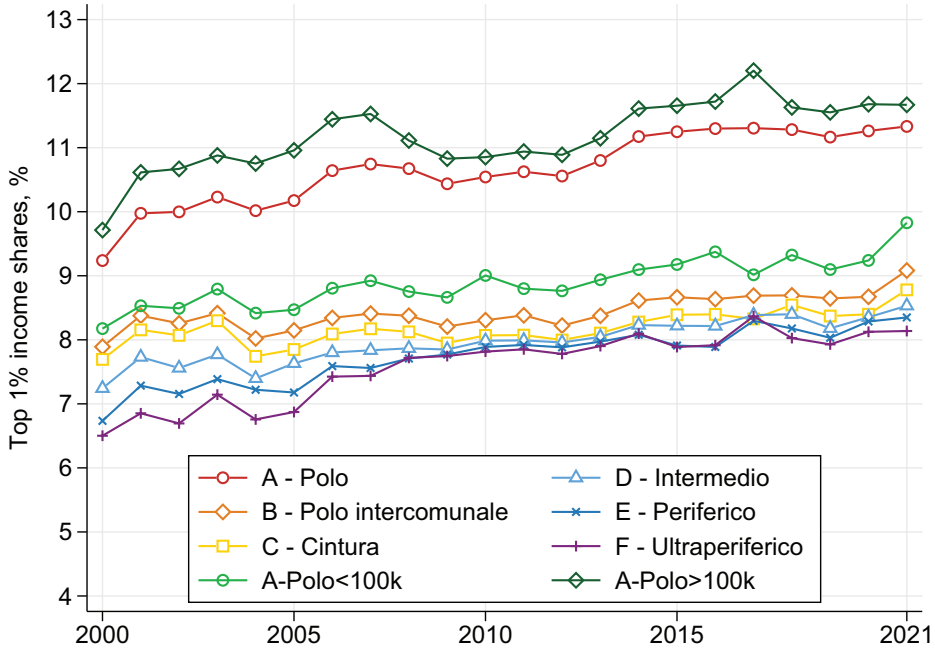
Figure 7: Top 1% income share by *Inner Areas* classifications



compared to the average, rising from 10% in 2000 to almost 12% in 2021. On the other hand, *A - Polo* municipalities with less than 100,000 inhabitants showed income concentrations levels and trend in line with the rest of the *C - Cintura* and *Inner Areas*, although with a slightly higher level of concentration (Figure 8). To better understand the difference in income concentration between *A - Polo* and other areas an analysis of income composition at the municipality level would be useful. However, the tax data on municipalities do not allow for such a level of detail. Therefore, further research is needed to fully understand the factors driving income concentration and inequality in different municipalities.

By looking at the richest individuals living in *Centers* and *Inner Areas*, we found that differences in average income and thresholds are persistent throughout the whole income distribution suggesting that fewer earning opportunities affect everyone in those areas. In particular, we found that to enter in the top 1% of the *A - Polo* municipalities, it is necessary to declare at least €166,824 in 2021, in *F - Ultraperiferico*, instead, it suffices less than half of this amount (€69,850), which is not even enough to be part of the National top 1% (€98,120). Average income also differs substantially. *A - Polo* leads the group with an average declared income of €232,442 in the top 1%. In comparison, the average income in the *F - Ultraperiferico* areas is only €108,022 (See Table 3) pointing at the fact that income earned by the richest individuals living in those areas is relatively

Figure 8: Top 1% income share by *Inner Areas* classifications with larger cities



limited.[15]

This is further confirmed by examining where the country's top 1% income earners live. Most of these individuals reside in the *A - Polo* municipalities. Interestingly, the national income threshold that defines the top 1% isn't high enough to accurately identify the richest 1% within these municipalities; In fact, approximately 1.5% of the population in *A - Polo* earns more than the national income threshold that defines the top 1%, as shown in Figure 9. In contrast, in all other municipalities, classified as *Centers* or *Inner Areas*, significantly less than 1% of the population earns more than the national income threshold that defines the top 1%. For example, in the *E - Periferico* and *F - Ultraperiferico* municipalities, only about 0.3% of residents earn enough to be part of the national top 1%.

[15] In the context of comparing average income and thresholds among municipalities, the use of purchasing power parity (PPP) is crucial to address potential distortions arising from variations in the cost of living. Istat's experimental statistics reveal significant regional price differences, such as Prov. Autonoma Bolzano being 5.33% above the average and Campania 9.53% below it (Brunetti et al., 2023). However, as of 2023, PPP data for Italian geographic zones are still experimental, covering a limited range of consumption baskets and lacking details for different municipality types. Consequently, the comparison using PPP has been deferred for future studies.

Table 3: Thresholds and Average income for top 1% in Inner Areas in 2021

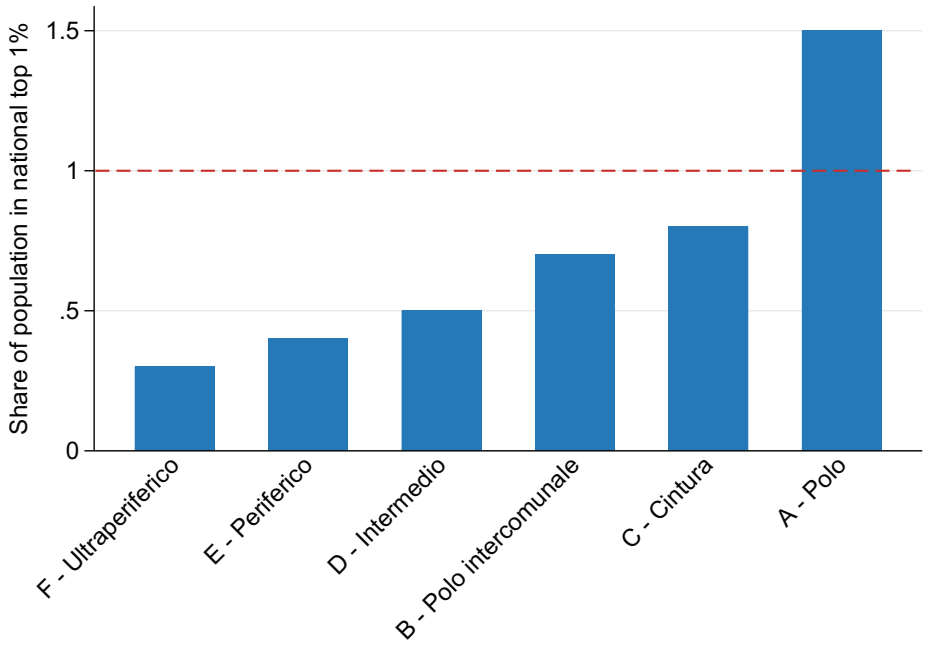
Inner Areas	*Threshold*	*Average income*
A - Polo	166,824	232,442
B - Polo intercomunale	82,693	152,700
C - Cintura	84,046	160,137
D - Intermedio	78,277	132,226
E - Periferico	73,982	116,996
F - Ultraperiferico	69,850	108,022

4 Income growth

We have shown the trend in income concentration, but what can be said regarding the reason of this increasing trend in income concentrations? Our analysis can also shed further light on this topic. By constructing anonymized growth incidence curve by income percentiles we can show that the rise in income shares for the top income group is determined by a spectacular increase in real income for these income groups since 1976. In Figure 10 we show the cumulative growth of real mean income for the 4 different income groups. We start with the bottom 90% of the population, which experienced a limited overall growth of 25%. This income group had an average income of €10,414 in 1976 (in 2021 prices) and reached an average of just €12,991 in 2021. Real income growth has been much stronger for top income groups. People between the 90th percentile and the 99th percentile (P90-99) had a real income of €27,707 in 1976 and to €52,344 in 2021, implying an increase in real income of 89%. The next percentiles between the top 1% and the top 0.1% (P99-99.9) had a similar real income growth of 85% from €74,358 to almost €138,000 in 2021. Finally, the very top of the income distribution, the top 0.1%, achieved an income growth of 196%, increasing their real income almost 4 times compared to its level of in 1976, from an average of €203,731 to €603,627 in 2021. We can further expand this analysis by examining the cumulative growth for different years to determine whether there have been any specific years in which the sustained real income growth for top earners has been reversed.

We selected 5 different intervals in line with choices of Brandolini et al. (2018) (Figure 11): i) From 1976 to 1993 when Net National Income (NNI) per-capita steadily grew to about 3.6% per year. Until the currency crisis in September 1992 forced Italy to leave the European Exchange Rate Mechanism; ii) From 1993 to 2006, when the NNI per-capita growth slowed down to an average of 1.8%; iii) From 2006 to 2013, when the Global Financial Crisis (2008-2009) and the Sovereign Debt Crisis (2001-2013) led Italy to a yearly income per-capita loss of -2.2%; iv) From 2013 to 2019 when Italy reached again a moderate income per capita growth of about 1.7%; v) and finally, we add the 2019-2021 period to capture exceptional and contrasting trends emerging from the recent Covid-19 pandemic.

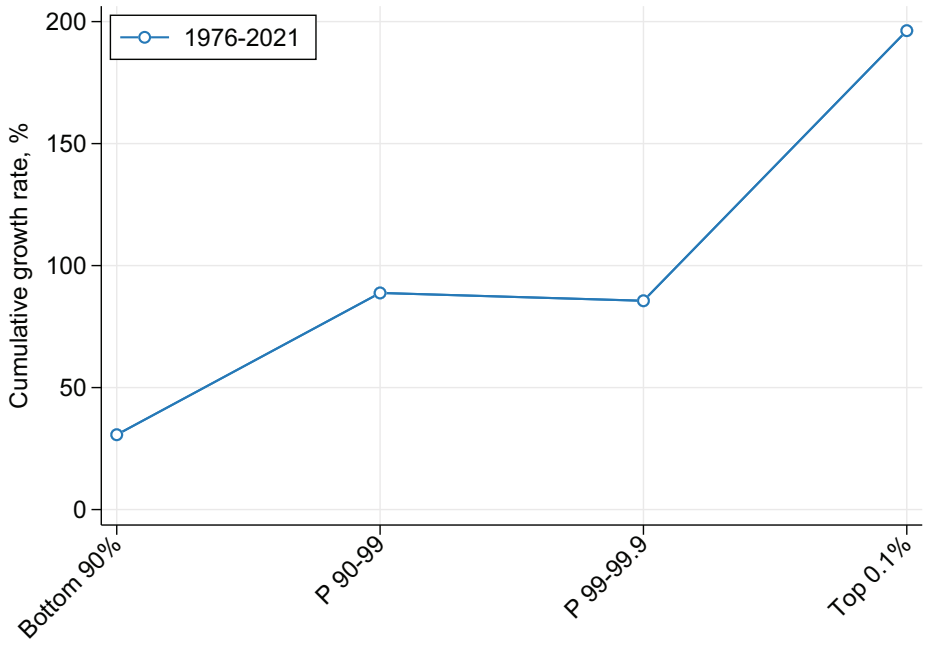
Figure 9: Share of regional population part of the National top 1%



Our analysis reveals that the top 0.1% income group experiences the highest average income growth during periods of overall income growth. However, during the financial and sovereign debt crises between 2006 and 2013, all income groups experienced a loss in real income. In this period, the top 0.1% and bottom 90% were hit the hardest, with an average yearly loss of about 2% of real income. As described by Morelli (2018) for the US, this was a temporary reduction of growth for the top 0.1% group, which subsequently returned to a substantial increase in real income, averaging 3.38% per year between 2013 and 2019. In contrast, the real income of the bottom 90% increased by less than 1% per year, at a similar pace to the next 9% (P99-99.9).

The Covid-19 pandemic shock hit the Italian economy hard as the lock-down measures to contrast the spread of the disease implemented in March 2020, "suspended or reduced activity in sectors that absorbed, in the last quarter of 2019, 44% of self-employed workers and 33% of employees (about 34% of total employment)", as reported in Carta and De Philippis (2021). National income, dropped by approximately -9% between 2019-2020 before bouncing by 7.3% between 2020-2021, with an overall cumulative real income loss of 2% in the 2019-2021 period. However, the overall effect of the pandemic shock on income concentration appears different than the effects of more standard recessions if we consider the overall two-year period from 2019 to 2021.

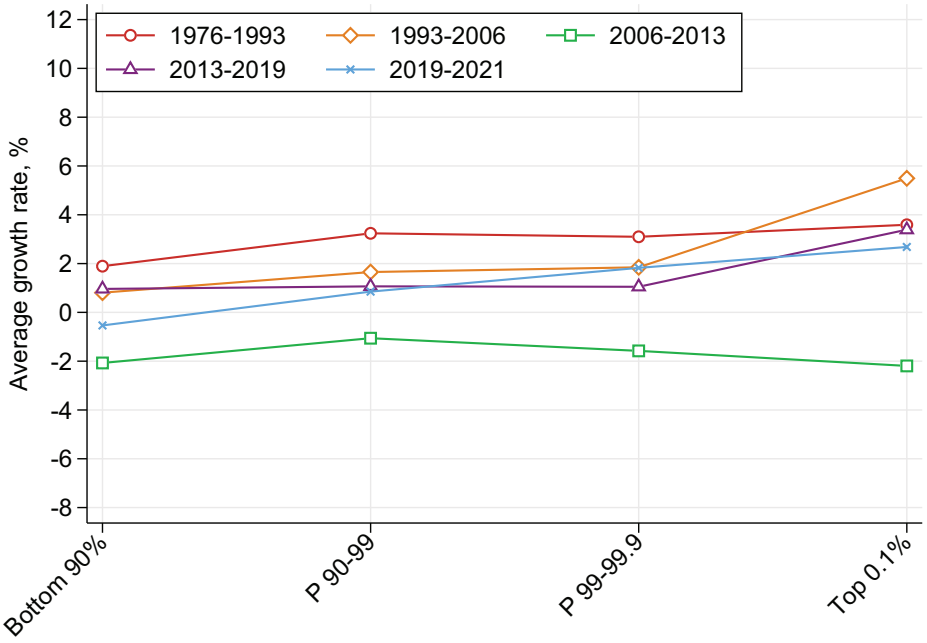
Figure 10: Cumulative growth of real income from 1976 to 2021 for selected income groups



Note: Real growth is calculated in 2021 prices using NIC indexes released by the National Statistical Office

As shown in Figure 11, only the bottom 90% group experienced negative income dynamics between 2019 and 2021. The pandemic shock shares similarities with the Global Financial Crisis in terms of their impact on incomes across the distribution only when looking at the income changes between 2019 and 2020, separately from that between 2020 and 2021. Figure E.2 in the appendix shows that all income groups have experienced a loss of real income between 2019 and 2020, but the bottom 90% and top 0.1% have been hit particularly hard, while the P90-99 and P99-99.9 groups have experienced a relatively smaller reduction in real income. In contrast, the income dynamics between 2020 and 2021 show substantial and historically high records of positive real income growth for the bottom 90% as well as the top 0.1% of the distribution, although only for the top 0.1% the real income growth was high enough to compensate for the losses experienced between 2019 and 2020. As a result, 2020 and 2021 mark the period with the fourth-highest increase in income ever recorded for the top 0.1% (Figure E.1). Interestingly, the results are also robust to the inclusion of income tax paid (Figure E.2). It is nonetheless worth noting that our analysis cannot take into account the large-scale social insurance and protection interventions rolled out by the government to protect households from large income losses. As discussed in Carta and De Philippis (2021) reliefs and social insurance benefits played a large role in effectively dampening the income losses of workers and the resulting increases in income inequality.

Figure 11: Average annual growth of real income from 1976 to 2021 for selected income groups



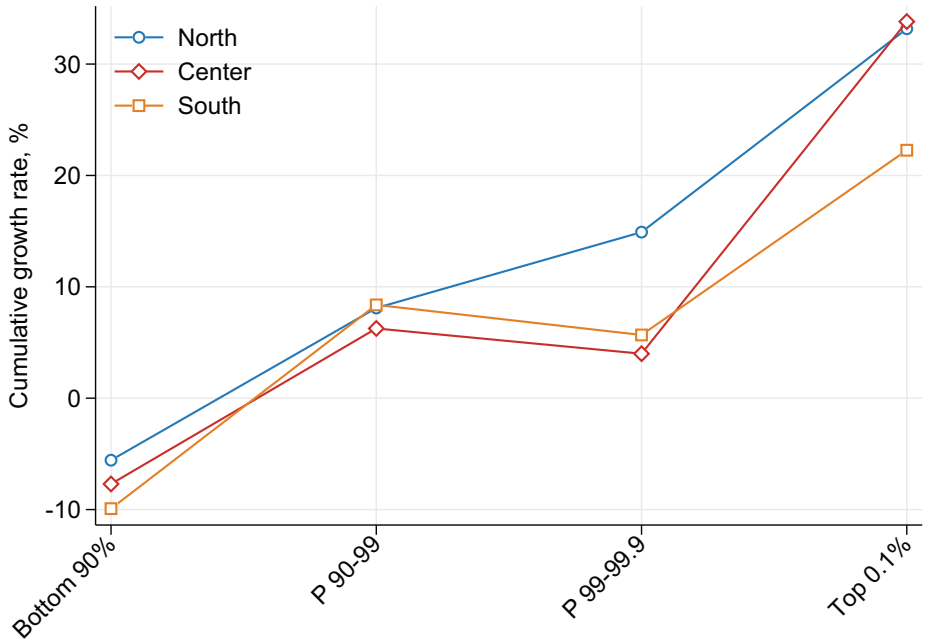
Note: Real growth is calculated in 2021 prices using NIC indexes released by the National Statistical Office

4.1 Income growth: macro area

These differences in concentration trends can also be studied by looking at cumulative income growth by macro areas. Also in this case the differences among the macro-regions remain across all the income groups. An important finding is that the bottom 90% in all macro-regions experienced an average reduction in real income between 2000 and 2021. This income loss is particularly pronounced in the South, where it reached approximately -10%, nearly double the loss experienced in the Northern regions (Figure 12). The top 10% instead, experienced positive growth in all the macro-regions although the percentile P99-P99.9 of Center and South had a moderate cumulative growth between 4% and 5.6%, respectively, while the cumulative growth was a higher for the North reaching a rate of almost 15%. On the other hand, in all macro-region, the top 0.1% experienced the highest income growth, especially in the Center and the North, with a cumulative growth rate above 33%. The average income grew from 456,798 in 2000 to €611,264 in 2021 for the Center, and from €516,979 to €688,472 in the North. Instead, the top 0.1% of the South was subject to a considerably lower growth from €241,795 in 2000 to €295,627 in 2021 implying an overall cumulative growth of about 22.26%.

By looking at the average income growth for selected years, we can show several differences

Figure 12: Cumulative real growth by Macro Regional distribution, 2000-2021

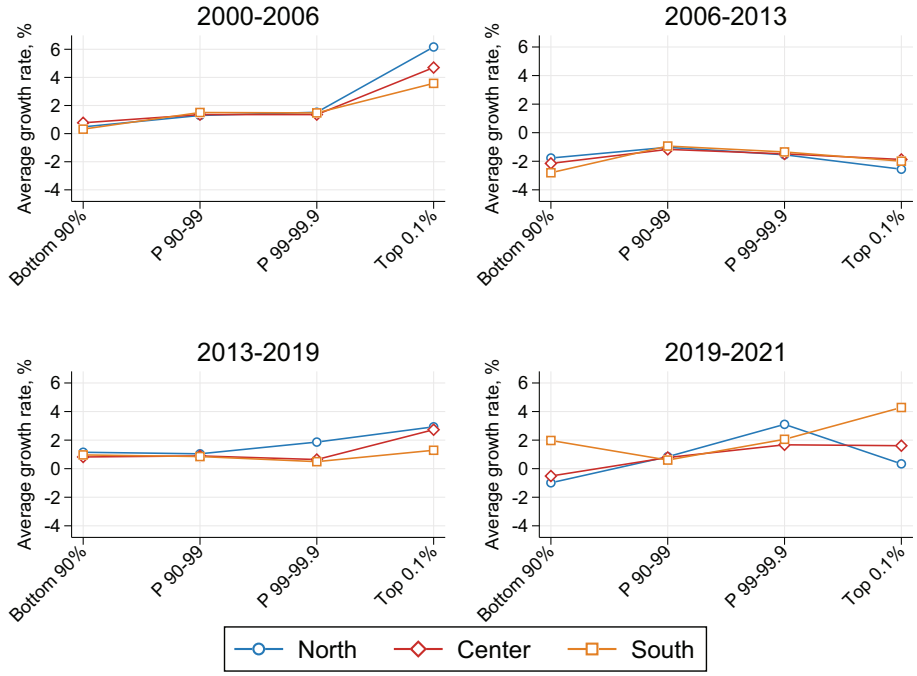


Note: Real growth is calculated in 2021 prices using NIC indexes released by the National Statistical Office

among the macro-regions (Figure 13). First the, The largest income loss experienced by the bottom 90% of the population occurred during the Global Financial Crisis and Sovereign Debt Crisis, spanning from 2006 to 2013. In subsequent years, the income growth for this group has been nearly zero, insufficient to recover from the losses incurred during the crisis period.

For the P90-99 and P99-99.9 instead, the growth experienced in the period 2000-2006 and 2013-2019, was enough to compensate for the loss in real income recorded during the crisis (2006-2013). This is true especially for the percentiles P99-99.9 of North which obtained a considerable growth in income during the 2013-2019 period, much stronger than what we observed for the Center and the South. During the Covid-19 crisis (2019-2021) we found considerable heterogeneity among macro regions. The bottom 90% experienced an average of -0.5% in the Center and of -0.98% in the North. The South instead experienced a positive income growth of almost 2%. This result, however, is mainly determined by our adjustment of the self-employment income earners in the favourable tax regime. These type of workers have to report their income directly net of the flat taxes paid and in our adjustments we estimate their income gross of the taxes paid. Unfortunately we are unable to re-rank the positioning of these individuals in the income distribution, therefore even if their true gross income would position them in top income groups, they are still included in the bottom 90% thus increasing the overall income of this group. When look-

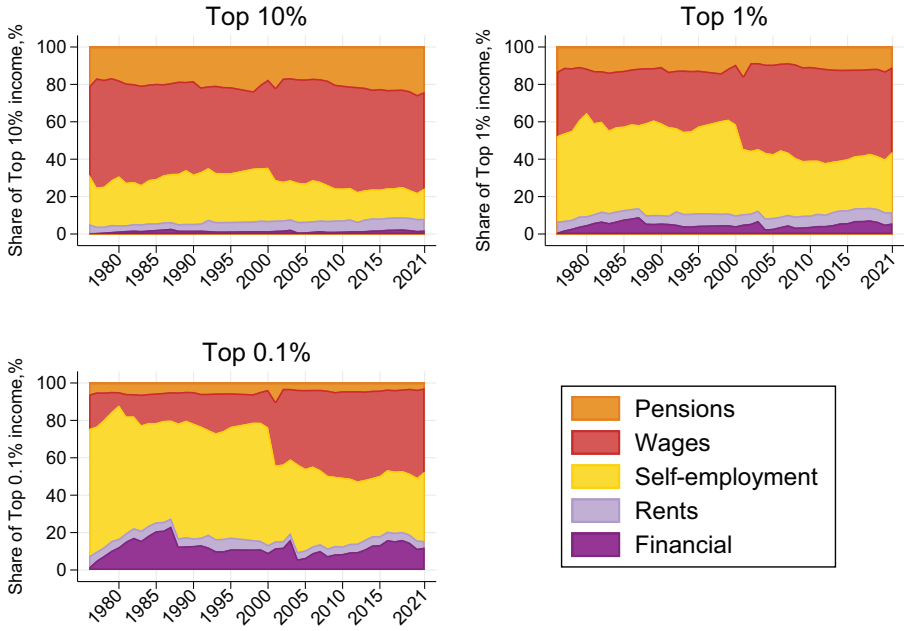
Figure 13: Average annual real growth by Macro Regional distribution



Note: Real growth is calculated in 2021 prices using NIC indexes released by the National Statistical Office

ing at the fiscal income distribution, where we do not make corrections for the income reported by the self-employed income in favorable tax-regime, the income loss of the bottom 90% of the South is in line with the other macro-regions (Figure E.7). The individuals between the P90-99 instead had a similar average growth among the macro-regions, but it differentiated farther in the percentiles P99-99.9. In this income group those in the North experienced the highest average income growth of 3.1%, followed by the South with a growth of 2%, and of 1.7% in the Center. The top 0.1% also experienced important differences among macro-regions. In fact we see that in the period 2019-2021 the South is the one with highest average growth of 4.2% while the Center and the North obtained only a moderate growth of 1.6% and 0.33% respectively. In summary, although all income groups faced losses during the first year of Covid-19 crisis, these losses were not large enough to counterbalance the substantial overall real income growth witnessed by the top income groups in the 2020-2021 period. This resulted in an overall positive average income growth for the top income groups across all geographical regions in the period 2019-2021.

Figure 14: Income composition for Top income as a share of total income

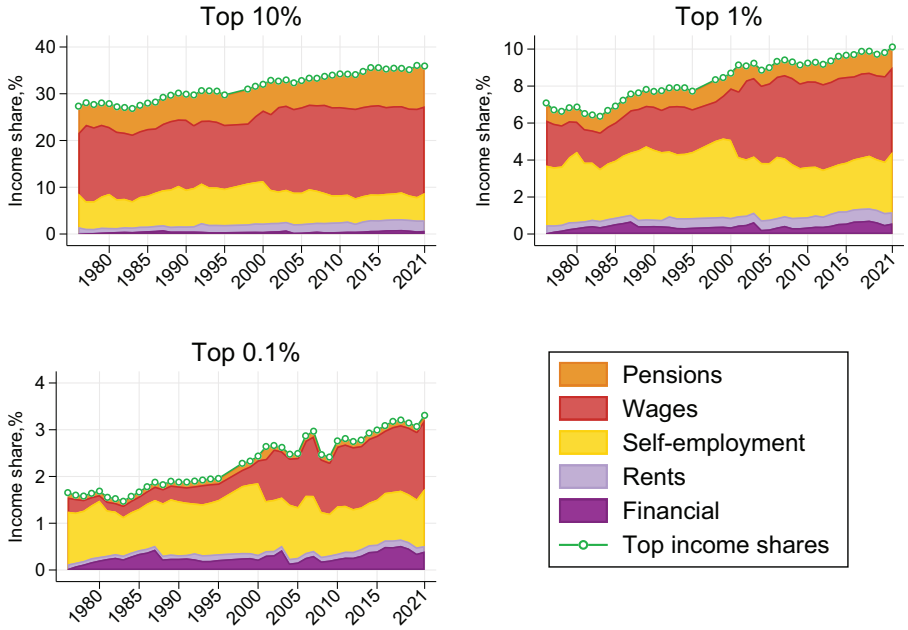


5 Income composition

This section delves into the income composition of the top income groups, examining the various types of income earned by these groups using the income categories assembled from income tax reports at the national and regional level. At the national level the results show that self-employment incomes become increasingly important as income grows. In 2021, it is worth approximately 40% of total income for the top 0.1% group and it drops to 20% approximately for the top decile (Figure 14). Also the observable components of rents and financial incomes grow in importance as we move up in the income ladder. Both sources of rents and financial incomes are worth approximately 20% of total income of the top 0.1% group in 2021. Conversely, and as expected, pensions become less relevant for the very top of the income distribution. This source of income is worth less than 1% of total income for the richest group observed (top 0.1%) and up to almost 40% for the bottom 90%. The case of wages appears more nuanced as the relative weight of wages appears rather constant throughout the distribution, and only marginally lower for the very upper income groups.

Looking at how income composition has changed over time we observe an overall stability of relative income components across the income distribution throughout the period, with the exception of financial income that gained relative importance in income composition rising from

Figure 15: Income composition for Top income : 1976-2021



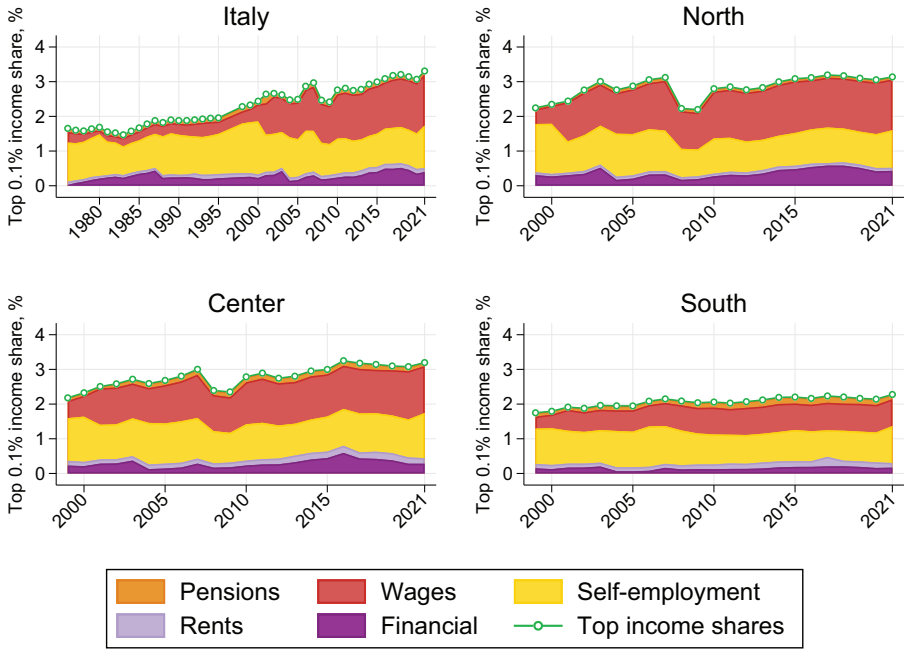
10% of the overall earned income of the top 0.1% group to about 20% in 2021.

Another important exception is shown by the abrupt change in income composition occurred around 2000.

In particular, between 1976 and 2000, self-employed income was the primary source of income for the top 1% of earners. After 2000, wage income becomes the most relevant source of income even at the top of the distribution. We speculate that this change was mostly driven by a change in the legislation, carried out in 2000 (law n 342). This legislation required that income stemming from project-based contracts has to be reported as wage income and no longer as self-employed income.[16] This change in legislation resulted in a clear break in the self-employed income series, which was almost entirely offset by an increase in employee income. Although these types of contracts are commonly used for low income earners at the beginning of their careers, they are also frequently utilized to formalize the earnings of CEOs and other high-level managers, which explains why the legislative change is particularly evident among the top 1% of earners. The relevance of the different income sources changes when we zoom with more precision on the very top of the income distribution. In fact, for the top 0.1%, there have been several changes through time. In 1976 almost all of the income was earned through self-employment income. Then, sim-

[16] known as 'contratto di collaborazione coordinata e continuativa' in Italian

Figure 16: Top 0.1% Income composition across macro-regions as a share of total income



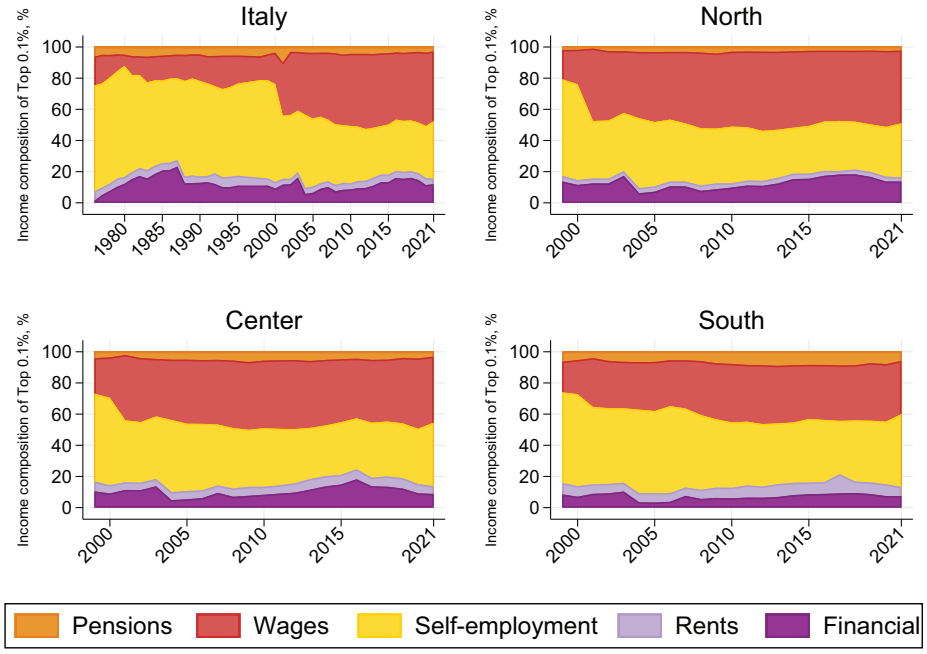
ilar to the top 1% group, the change in legislation of 2000, brought employee income to the level of self-employed income and started to drive most of the income growth of this group (Figure 15).

5.1 Income composition at the macro area

In this section we investigate how income composition differs among income groups through time and among macro-regions.

The composition of income of the top 0.1% presented in Figure 16 reveals that the decrease in income share for the Center and Northern regions during the Global Financial Crisis was not solely due to a reduction in financial income, but rather a combination of financial, employee, and self-employment income. However, these income sources have since grown, particularly financial income, which has driven most of the increase in income share for these regions up until 2016, after which it has gradually declined. Another important finding is the role of pension income, which is largely absent from the top 0.1% in the Center and Northern regions but it is significant in the South. In fact, pension income is also the main determinant of the increase in income share for the top 10% and top 1% in the South. Conversely, financial income plays a much smaller role in the South compared to its relevance in the North and in the Center, where it contributes

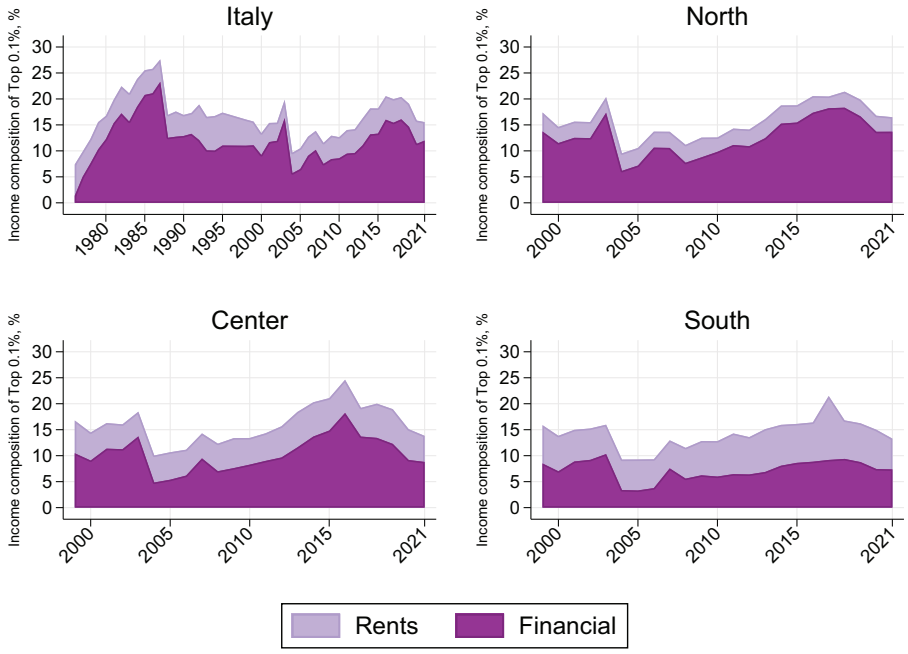
Figure 17: Top 0.1% Income composition across macro-regions as a share of total income



significantly to the income share of the top 0.1%.

Figure 17 provides further clarity on the composition of income for the top 0.1% across different macro-regions as a share of their total income. The data reveals a significant difference in the income composition across regions. In particular, there has been a noticeable decline in the relevance of business and self-employed income for the top 0.1% in Northern Italy. At the beginning of the century, financial income and business income accounted for approximately 80% of the total income for this income group. Today, they account for around 55%, mainly due to the decrease in self-employment and business income, which reduced from 65% to less than 40%. This decline has also been experienced, although to a lesser extent, in the Center and the South. However, the South remains the macro-region where self-employment and business income are the most relevant sources of income for the top 0.1%, accounting for 52% of their total income, while financial income only accounts for less than 7% of their total income. With regard to financial income, a significant decline can be observed in all three macro-regions in 2004. This was due to a new tax reform in Italy that changed the rules for declaring a certain type of financial income (for more information, please refer to Appendix A.3). While our methodology can only partially adjust for this change, most of the financial income recorded in National Accounts is still missing from this analysis. Nonetheless, an increasing trend in the accumulation of financial income by

Figure 18: Top 0.1% Income composition across macro-regions as a share of total income



the top 0.1% can still be observed in all macro-regions, although it is much lower in the South. As shown in Figure 18 this increase is mainly due to an increase in concentration of financial income that is more relevant for the Northern and Center regions. On the other hand, actual rents, are as important as financial income in the South accounting together about 15% of the total income of the top 0.1% , but didn't exhibit any particular trend remaining stable over the considered period.

6 Conclusion

How are incomes, wealth, and tax burdens distributed in the population? Answers to such important questions are fundamental to informing, among other things, serious and credible tax policy interventions.

In this paper, we use detailed income tax tabulations in Italy to derive a set of income concentration measures as well as growth incidence curves across different income groups, income definitions, and geographical areas. Similar to previous studies (Alvaredo and Pisano, 2010), we confirmed a surge in income concentration towards the upper end of the income distribution beginning in the 1980s, driven by a spectacular real income growth of the top income groups, which was considerably larger than that of the bottom 90% of the population. By building up-to-date

income concentration measures, we also highlighted that in 2021, in the aftermath of the Covid-19 crisis, the top 1% and the top 0.1% held the highest share of income ever recorded, at 10.11% and 3.31%, respectively. Focusing on regional and macro-regional analyses, we show the importance of studying income concentration measures at a finer geographical disaggregation and with different metrics. We show that exist large heterogeneity between regions and macro-regions both in terms of income composition and income concentration measures. In particular, we found that although the Southern regions appear to be the most unequal when considering the top 10% income concentration, the Northern and Central regions appear more unequal when focusing on the top 1% and top 0.1%.

The availability of municipal-level tabulations made it possible to derive income concentration measures for the geographical classification used in the National Strategy for Inner Areas, which classifies municipalities according to their distance from essential public services such as healthcare facilities, education, and transport. Despite the policy relevance of this classification, no systematic evidence on top income concentration existed for such a granular geographical unit in Italy until now. In this regard, we highlighted that municipalities with less accessibility to public services do not necessarily have higher inequality. Instead, we found that among municipalities with the highest level of accessibility to public services, larger municipalities with populations above 100,000 inhabitants have the highest levels of inequality.

Ultimately, one of the goals of this work is also to produce publicly available data files including series and estimates of income inequality across a set of geographical units.

However, despite the contributions we laid out in this work, the paper continues to offer only a partial and unsatisfactory representation of income distribution in Italy and across different Italian geographical units. We highlight a number of challenges calling for substantial investments in the statistical capacity, to better represent income distribution in Italy using income tax files.

First of all, the coverage rate for capital incomes in the tax records remains very low (i.e. lower than 10%). This limitation severely undermines our capacity to estimate the real distribution of income in Italy as well as the effective rankings of individuals in the income distribution. The separate taxation of investment incomes does not prevent tax authorities from requiring these incomes to be reported on tax returns or even pre-filled in part, using third-party information-sharing requirements in effect for financial intermediaries acting as tax withholding agents for individual investors. Such information would be crucial to improve the current information on the income distribution of Italian adults.

Secondly, a larger role for tax audits, both random and targeted to high-income and high-net-worth individuals may reveal precious information about how income tax evasion can be imputed along the income distribution, especially the largest component of income tax evasion linked to self-employed income. Adequate funding, specialized personnel, and scheduling of

random and targeted assessments are also fundamental to credibly combat tax evasion. Indeed, a deterrence effect of audits leads audited individuals to report more incomes in the ensuing years. A study by Boning et al. (2023) estimated that 1$ spent on audits by the U.S. Federal tax authority, the IRS, has a return that is higher the wealthier the audited person is. Whereas audits of low-income taxpayers bring in $5 for each $1 spent, the return is $12 for each $1 spent for high-income taxpayers. Growing body of evidence on the deterrence effect is also found for Italian tax payers (i.e. see the work by Battaglini et al., 2019).

Lastly, despite the focus of this paper on individual measures of income concentration, a household-based perspective on income distribution remains a crucial dimension to analyse. The latter dimension, however, cannot be presently assessed using income tax tabulations. Information on household structure is already available to tax authorities and tax tabulations should also be provided aggregating incomes within the household units. This would allow researchers to use equivalization scales to control for household size and composition when estimating income inequality measures.

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A Methodological details on Numerators and Denominators

To calculate top income shares, we use the income declared in tax returns by the top richest individuals and divide it by an external denominator that includes the total income earned by people if everyone had to file tax returns and adjusting for some type of deductions. Although we build on the methodology structured by Alvaredo and Pisano 2010 (henceforth AP), we made some relevant changes in the construction of the denominator and in the classification of the type of income reported in tax returns. To compare the differences between our methodology and AP, and to compare how much of the fiscal income constructed in the denominator is actually included in the tax tabulations, we have divided the following section into three parts: i) wages and pensions A.1, ii) self-employment income and business income A.2, iii) capital income A.3.

A.1 Wages and Pensions

For the choice of the numerator for income from wages and pensions in Personal income tax tabulation, AP uses *wages*, *income from employed activities or similar*, *pensions* and *income from activities with the option of separate taxation*. We follow their categorization, but we exclude *income from activities with the option of separate taxation*. These types of income are, in fact, much more similar to self-employment activities and should be categorized as such. On top of these income categories, we also include *other social security income* (Altri redditi prevvidenziali) and *benefits*, which are a particular type of income disbursed to employed workers.

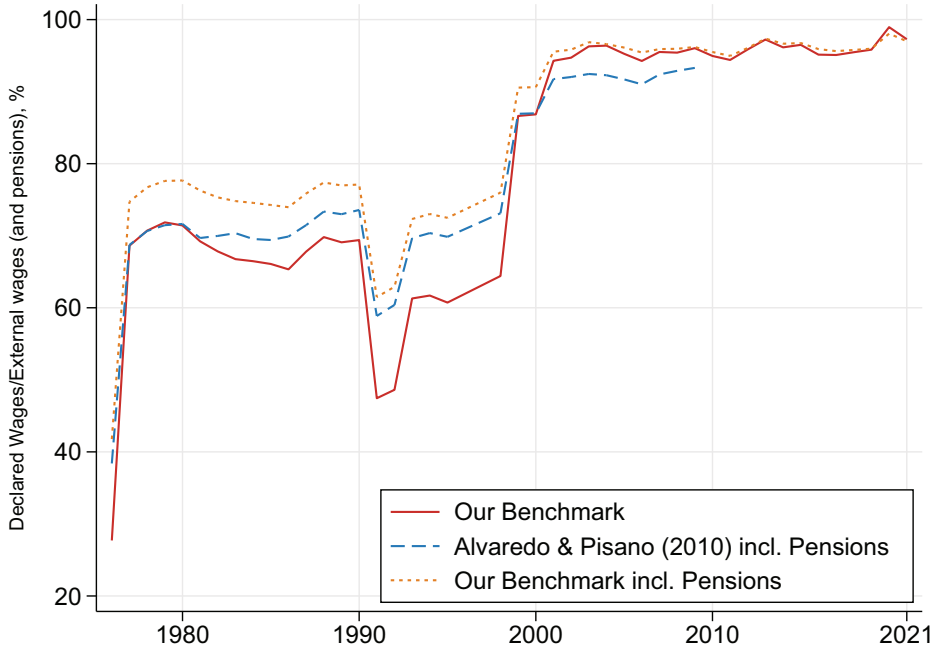
For the part of the denominator relative to employed income and pensions, AP uses from National Accounts the variable *D1 - compensation of employees from the household sector*, net of *D611 employer actual social security contributions,* and *D613CE actual employee social security contributions* paid to the public sector. For pensions, AP uses data directly from INPS on *Pensions old age, seniority and survivors + allowances* (*Invalidità, Vecchiaia, Superstiti, Indennitarie*).

We follow AP to choose the denominator, but we make one necessary change. We use *D611 employer actual social security contributions* and *D613 employee actual social security contributions* paid by the household sector instead of using the amount received by the public sector. The difference is minimal for older years, but it has increased in more recent years since it became more common to have reserves for social contributions directly in the companies.

There is no need for specific changes to create the denominator at the regional level since both the variable from NA for the household sectors and the INPS data on pensions are available at the National and Regional levels.

The reporting of pensions data at the national level in tax tabulations changed after 2003.

Figure A.1: Ratio of wages and pensions declared over the external data



Prior to that year, pensions were included in wages. To estimate pensions data for periods before 2003, we assume that the proportion of pensions held by each income fractile remains the same as it was in 2003. Additionally, we maintain the share of total reported pensions in tax tabulation in line with the total pensions data from INPS.

Figure A.1 show the ratio between the total employed income and pensions (considering only employed income) reported in tax tabulations, compared to the denominator in our benchmark series and in Alvaredo and Pisano 2010's work. In Figure A.2, we present the same analysis, but focusing solely on pensions.

Table A.1 present the total amounts, in current prices, reported at the national level for wages and pensions using our benchmark series, along with the total amounts derived from external data used as the denominator in our calculations.

Figure A.1 shows the ratio between the total employed income and pensions reported in tax tabulations and the total used in the denominator in our benchmark series and in Alvaredo and Pisano 2010.

Figure A.2: Ratio of pensions declared over the external data

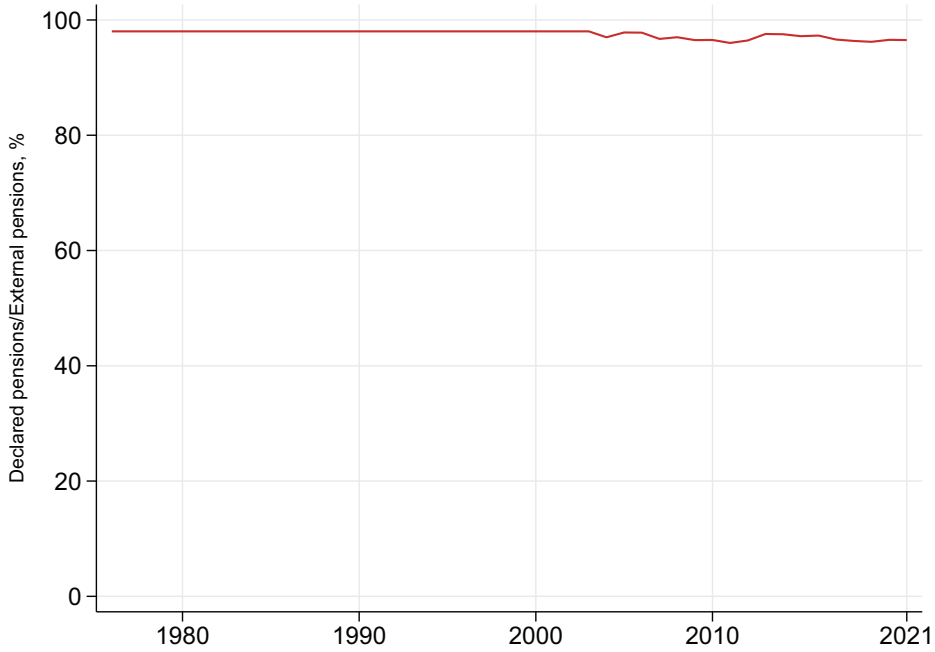


Table A.1: Wages and Pensions totals from tax data and NA, current prices

Year	Wages Tax	Wages NA	Pensions Tax	Pensions INPS
1976	8,764	31,627	7,758	7,915
1977	26,470	38,573	9,908	10,107
1978	31,593	44,679	12,378	12,628
1979	38,929	54,178	14,976	15,278
1980	47,636	66,688	20,048	20,453
1981	56,389	81,463	25,898	26,421
1982	64,671	95,353	30,872	31,494
1983	73,304	109,815	37,353	38,107
1984	81,684	122,889	41,547	42,385
1985	90,704	137,261	46,374	47,309
1986	97,107	148,626	52,196	53,249
1987	108,570	160,134	57,113	58,265
1988	122,394	175,312	63,156	64,430
1989	133,158	192,734	70,793	72,220
1990	149,804	215,860	78,120	79,695
1991	111,759	235,541	88,705	90,494
1992	119,880	246,574	98,443	100,429
1993	153,896	251,076	105,638	107,768
1994	158,153	256,320	113,689	115,982
1995	159,693	262,986	118,788	121,184
1998	183,396	284,715	146,580	149,536
1999	254,760	294,091	151,976	155,041
2000	270,479	311,448	156,002	159,149
2001	309,827	328,616	163,000	166,287
2002	325,602	343,752	170,581	174,022
2003	344,543	357,833	177,359	180,936
2004	357,805	371,214	185,160	190,891
2005	371,484	389,986	192,568	196,834
2006	388,156	411,814	199,991	204,491
2007	406,078	425,185	206,024	213,027
2008	418,741	438,876	213,595	220,179
2009	416,500	433,703	223,324	231,410
2010	418,159	440,394	228,200	236,400

2011	422,904	447,992	233,864	243,580
2012	425,147	443,505	238,810	247,620
2013	424,676	436,742	243,617	249,689
2014	423,028	439,971	247,212	253,491
2015	434,694	450,483	249,226	256,442
2016	441,452	464,023	251,112	258,093
2017	452,010	475,366	253,064	261,959
2018	465,937	488,030	258,138	267,880
2019	476,353	497,093	264,545	274,964
2020	462,558	467,463	270,875	280,548
2021	489,980	503,712	275,516	285,480

A.2 Self-employment and business income:

In AP, self-employment and business income from tax tabulations are defined as the sum of agricultural income, farm income, self-employment income, business income, and income from start-ups. We keep this categorization, but on top of it, we add the following income categories:

- Land income (reddito dominicale)
- Income from buildings (reddito da fabbricati)
- Income deriving from partnerships or family businesses
- Losses from partnerships or family businesses
- Rental income (from cedolare secca)
- Income from activities with the option of separate taxation
- Income from other miscellaneous events (redditi diversi)

We include all these additional income categories to be more consistent with the choice of the denominator from NA. The original denominator for self-employment and business income used by AP is given by half of the share of income transferred from the producers household sectors to the consumers (D4Q from NA) net of the D613CNAS self-employed actual social security contributions paid to the public sector. The underlying assumption of AP is that half of this income variable is completely evaded and thus cannot be distributed to individuals without using strong assumptions. For the denominator, we make several improvements. First, it is necessary to recognize that although the contributions paid by employers and employees are not part of the total income in the personal income tax returns,[17] the same does not apply to contributions paid by

[17] Pursuant to Article 51, paragraph 2, letter a) of the Tuir

self-employed workers. The legislation provides for the complete deductibility of the social contributions paid by self-employed workers so that they are not included in the taxable income.[18] However, the social security contributions paid contribute to the formation of the total income. They, therefore, are present in tax returns, and the income denominator or numerator should take this into account.

In our benchmark series, we aim to ensure consistency across different types of reported income by estimating social security contributions (SSC) paid by the self-employed for each income bracket and deducting it from the total reported income. In this way, none of the reported income sources include SSC.

To estimate the SSC amount, we first identify the hypothetical underlying income on which SSC is calculated. This is obtained by considering all self-employment and business income components, excluding rental income and income from advantaged regimes (referred to as "regime forfetario" in Italian), which requires separate consideration.

For gross self-employed income, we apply a different rate for each year (refer to Table A.2) and ensure that the total contribution is capped since it is not legally required to pay SSC beyond a certain threshold (capped amount also shown in Table A.2).

To address the years before 2003, where information on self-employed taxpayers is not available, we assume that the proportion of self-employed individuals remains the same as it was in 2003, and their distribution within each year remains constant.

For those in advantaged regimes, starting from 2015, they report their income directly net of the flat-tax rate and SSC. To adjust for this inconsistency, we utilize specific tabulations released by the tax authority, which provide details about their reported income in each income bracket. We estimate their gross income by applying a 15% tax rate, assuming an SSC rate as shown in Table A.2, and using a fixed taxable coefficient from Table A.2. Although the taxable coefficient theoretically varies based on the sector of the self-employed, we calculate a fixed coefficient as the weighted average of the value added generated by each sector, retrieved from the tax authority's data on value added by sector.

At the regional level, adjusting for taxpayers in advantaged regimes requires additional work. As we only know the total amount reported by these taxpayers in each region from tax tabulations, we assume that the distribution within each region is the same as at the national level, where we have more detailed information for each income bracket. For this reasons, in our benchmark series we also substract the variable *D613CNAS social security contribution* paid by self-employment from the denominator, although in our *Reported income* series we do not make any adjustment for the social security contributions of self-employed workers and thus, for that series, we do not subtract the variable *D613CNAS social security contribution* from the denomi-

[18] article 10, paragraph 1, letter e) of Presidential Decree no. 917/86

Table A.2: Adjustment of Social Security Contributions for Self-employed worker, current prices

Year	SSC rate	SSC cap	Taxable Coefficient
1996	10.00%	68'172	
1997	10.00%	70'831	
1998	12.00%	72'035	
1999	13.00%	73'332	
2000	13.00%	74'506	
2001	13.00%	76'443	
2002	14.00%	78'507	
2003	14.00%	80'391	
2004	17.80%	82'401	
2005	18.00%	84'049	
2006	18.20%	85'478	
2007	23.50%	87'187	
2008	24.72%	88'669	
2009	25.72%	91'507	
2010	26.72%	92'147	
2011	26.72%	93'622	
2012	27.72%	96'149	
2013	27.72%	99'034	
2014	27.72%	100'123	
2015	27.72%	100'324	68.3%
2016	27.72%	100'324	71.4%
2017	25.73%	100'324	71.9%
2018	25.73%	101'427	72.1%
2019	25.73%	102'543	72.6%
2020	25.73%	103'055	72.7%
2021	25.98%	103'055	73.2%

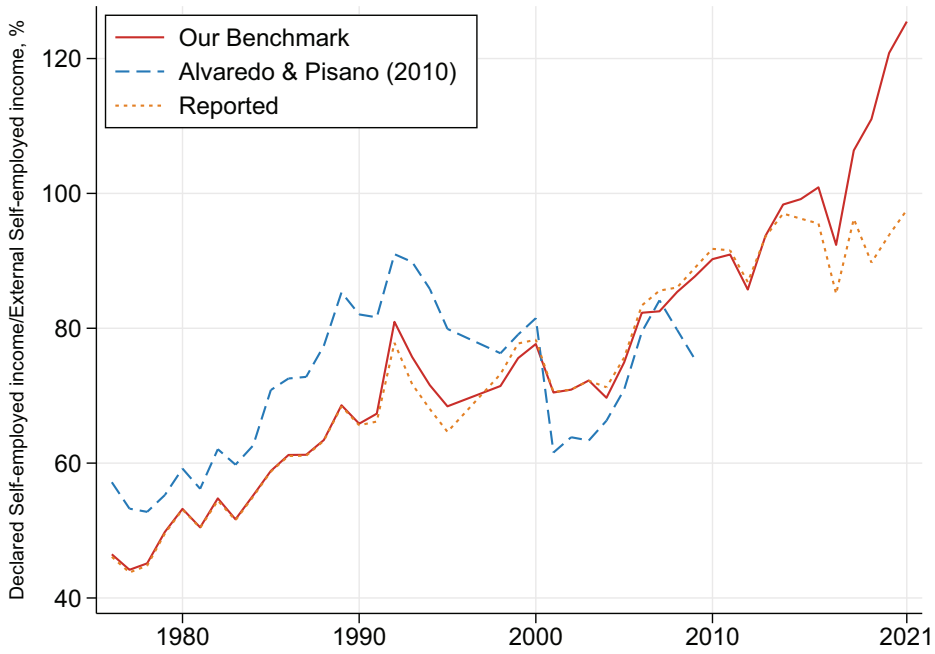
nator.

Moreover, instead of using the variable D4Q as used by Alvaredo and Pisano (2010), we prefer to use the variable B3N mixed-income from the Producers Household sector in National Accounts, which includes the income received for self-employed activities plus rental income.[19]

Our decision to depart from the choice of AP is due to a substantial methodological change in the construction of the variable D4Q in the new national accounts. Before the Sec2010 revision, this variable was calculated as the sum of B3N mixed-income and B2N net operating income of the producers of the household sector minus the amount that self-employed decided to keep to run their business. However, this is no longer true in Sec2010, and D4Q is virtually identical to the sum of B3N and B2N for consumers and producers of the household sector. Unfortunately,

[19]https://www.istat.it/it/files//2020/12/REPORT-CONTI-TERRITORIALI_2019.pdf

Figure A.3: Ratio of self-employment and business income declared over the external data



there are no satisfactional descriptions about the revision of this variable in the methodological compendium of the Istat Sec2010 update.[20] Therefore, we decided to focus solely on the mixed-income from the household sectors' producers and disregard the net operating surplus, which contains only imputed rents. Then, instead of following AP by assuming that half of this income variable is evaded we take the actual estimation on evasion of value added estimated by Istat between 2000 to 2020.[21] Never the less we noticed the value of evasion follow very closely the trends and level of half of the mixed-income, therefore we assume that for years before 2000 the substitute the missing values of evasion with half of the mixed-income similar to the original assumption of AP.

On top of these changes, we also add an additional variables in the denominator series that AP did not use: D422 Withdrawals from income of quasi-corporations. Although this variable is within the capital income category in NA, it should be categorized as self-employment or business income for fiscal purposes. In fact it is income withdrawn by the owners of small companies, and in these cases, this income is declared as a form of business income in personal income tax and for

[20] see "I Nuovi Conti Nazinoali in Sec2010: Innovazioni e ricostruzione delle serie storiche (1995-2013)" published the 6th of October 2014 - https://www.istat.it/it/archivio/133556

[21] https://www.istat.it/it/files//2022/10/ECONOMIA-NON-OSSERVATA-NEI-CONTI-NAZIONALI-ANNO-2020.pdf

this reason, we include it in the denominator.

When moving to regional denominators, we need to adjust the mixed-income variable, which is not reported separately from the net operating surplus in the Regional Accounts. Therefore we split the mixed-income from the "net-operating surplus plus mixed-income" in every region by assuming that the share of mixed-income on the sum of net operating surplus plus mixed-income is the same calculated at the national level. As for the measure of evasion we only have data at the regional level for the most recent periods between 2017 and 2020. We noticed that in this period the distribution of evasion among regions is relatively constant, thus, to obtain consistent results with national estimates, we will assume that the total evasion estimated at the national level between 1999 to 2016 is distributed among regions with the same proportion that is registered for 2017. Finally, we can easily take the totals of the variable D422 Withdrawals from income of quasi-corporations from the regional accounts without further adjustments.

Figure A.3 shows the ratio between the total self-employed and business income reported in tax tabulations and the total of the denominator derived from National Accounts.

Table A.3: Self-employed totals from tax data and NA, current prices

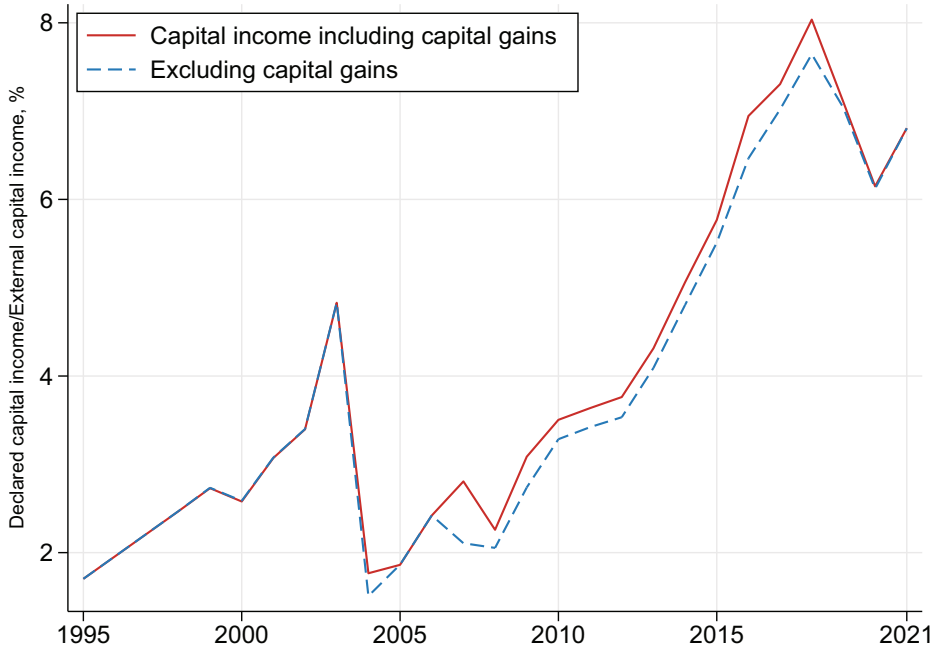
Year	Self-employed Tax	Self-employed NA	Self-employed Tax inlc. SSC	Self-employed NA incl. SSC
1976	6,983	15,023	7,620	16,528
1977	8,095	18,322	8,826	20,157
1978	9,578	21,222	10,457	23,347
1979	12,812	25,733	14,028	28,310
1980	16,857	31,674	18,505	34,846
1981	19,239	38,119	21,132	41,937
1982	24,035	43,881	26,284	48,275
1983	25,895	50,118	28,406	55,137
1984	30,633	55,482	33,587	61,038
1985	36,446	61,939	40,024	68,141
1986	40,757	66,585	44,732	73,253
1987	44,948	73,398	49,338	80,749
1988	51,348	80,961	56,391	89,068
1989	60,339	87,973	66,213	96,783
1990	64,690	98,238	70,910	108,076
1991	69,969	103,910	76,716	115,942
1992	86,353	106,670	94,004	120,753
1993	79,458	104,906	86,900	121,186

1994	81,510	113,899	89,130	131,019
1995	84,109	122,918	91,780	141,979
1998	102,825	143,934	113,590	155,174
1999	114,235	151,156	126,743	163,017
2000	118,749	152,896	131,737	168,244
2001	107,523	152,565	119,231	169,003
2002	109,195	154,019	122,044	172,112
2003	113,329	156,839	126,676	175,418
2004	114,659	164,519	132,260	185,619
2005	117,331	156,575	135,630	179,272
2006	130,099	158,073	150,574	180,577
2007	129,737	157,221	157,216	183,692
2008	120,719	141,374	147,840	171,808
2009	114,523	130,611	140,956	158,457
2010	115,850	128,363	143,634	156,501
2011	117,290	128,976	145,005	158,377
2012	104,546	121,922	133,737	153,989
2013	110,981	118,442	139,556	149,129
2014	115,033	116,960	143,590	148,009
2015	117,500	118,500	145,368	151,025
2016	120,705	119,622	146,008	152,827
2017	108,270	117,217	128,346	150,797
2018	130,492	122,669	150,886	156,821
2019	132,957	119,756	139,204	155,112
2020	123,277	102,025	128,360	136,787
2021	139,686	111,319	143,073	146,681

A.3 Capital income:

Capital income in AP is treated differently than the other categories. The authors prefer not to determine a specific capital income from NA or other sources because this category is substantially under-represented in tax tabulations. Indeed, most of the capital income in Italy is withheld at sources and taxed at a flat rate. Only dividends, interests and financial capital gain from qualified shares (income received by capital investments in business in which the shareholders own more the 40% of the company) should be reported in tax returns. Moreover, since 2004, for some categories of the capital income taxed within the PIT, only 40% should actually be reported on tax

Figure A.4: Ratio of capital income declared over the external data

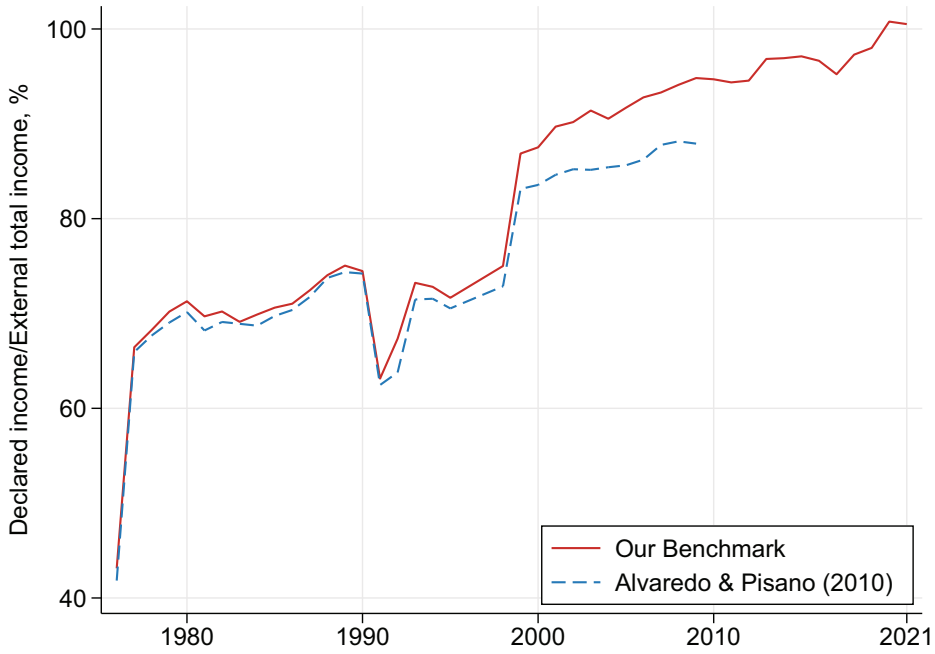


returns. To avoid extreme assumptions on the distribution of the portion of capital income not reported, AP decided to focus only on the reported amounts as the measure of capital income to be included in the denominator.

We follow their choice in constructing this denominator, but we use a considerably different definition of capital income from tax tabulations. While we include only the type of income reported as investments income and capital gains, they include all the types of income that have not been defined as wages, pensions, self-employment or business income. Table A.5 and Table A.6 summarize the differences between our series and AP in constructing the numerator and denominator, respectively, for all the income categories.

The last significant improvement over the choices of AP regards the revaluation of investments income and capital gains since 2004. The authors justify their adjustment of these two categories of capital income since they should be declared for personal income tax purposes only at 40% of their values starting from 2004. However, this is not entirely accurate. The income from investments in the personal income tax returns includes the sum of lines RL1.col2, RL2.col2 and RL4.col2 of the tax return. Line RL1.col2 indicates the profits and proceeds paid by joint-stock companies, businesses, or commercial entities. This allows for a distinction to be made between the amount to be included based on the criterion of participation (whether the income

Figure A.5: Ratio of total income declared over the external data



is due to qualified participation or not) and location (based on the location of the company). Based on these criteria and the year in which the profit was produced, this type of income must be reported at 40%, 49.72%, 58.14% or even 100%. Therefore, only a part of the entire value of investment income in the personal income tax returns must be reported at a rate lower than 100%. The adjustment made by AP assumes that the entire amount of investment income has been reported in tax return at 40%, but, as explained, only a fraction of this income should be included for less than 100%. A similar argument can also be made for the financial capital gains that AP, however, did not consider. The financial capital gains in the personal income tax are given by the sum of lines RT66 and RT87 of the tax returns. However, only the values in line RT66 envisage that the incomes are reported to the extent of less than 100%. In particular, they can be registered at 40%, 49.72% or 58.14% based on the reference period of the sale of the qualified shares. Also in this case, not all the financial capital gains can be reported at a rate of less than 100%. Proposing an arbitrary adjustment, as in the case of investment income, could create an excessive distortion to the advantage of the richest individuals.

For these reasons, we adjusted investments income and financial capital gains as the average between the amount actually reported and the hypothetical amount if all of those income sources were reported at 40% of their actual value.

To understand the extent of the under-representation of the capital income in the tax return with respect to the overall capital income in official statistics, we can use the variable "D41 - Interests", "D421 - Dividends", and "D423 - Other distributed income of corporations" from NA from the household sectors. For capital gains, choosing a counterpart from external statistics is not straightforward. In fact, capital gains are not registered in National Accounts, and we do not have direct official statistics for it. However, since 1995, the NA reports the amount of flat-rate taxes received by the public administration upon capital gains obtained by individuals. By dividing them by the flat tax-rate, we can get capital gain earned by individuals.[22] By summing this value and the amount of capital gain reported in tax returns, we can construct the denominator for the hypothetical overall capital income that should be reported in tax returns if they were to be taxed with PIT.

In Figure A.4, we show that the capital income reported in the tax return is considerably low compared to external statistics. For this reason, we decided to follow the AP method to avoid any extreme assumption on the distribution of the unreported capital income. Thus, we use only the declared capital income as denominator.

A.4 Final numerator and denominator series:

Finally, by summing all the income in tax returns for the numerator and all the external variables for the denominator, we can find the amount of additional income that is not present in tax return. Since we do not make any further adjustment to the income declared by the top 10% of the richest individuals, we implicitly assume that this extra income present in the denominator series is earned by those at the bottom 90% of the income distribution. In Figure A.5, we show that in more recent years the declared income has increase substantially begin between 80% and 90% of our external income definition, while before 1999 this ratio was lower between 71% and 87%.

[22] The flat tax-rate was 12.5% from 1995 to 2012, 20% from 2012 to 2014 and 26% since 2014

Table A.4: Tax data and External Data in our Benchmark definition

Income category	*Benchmrk Tax data (with adjustments)*	*External data*
Wages	Wages	D1 Compensation of employees (HH sector NA)
	Income from employed activities or similar	D611 Employers' actual social contributions (-) (HH sector NA)
	Other social security income	D613CE Employees' actual social contributions (-) (HH sector NA)
	Benefits	
Pensions	Pensions	IVSI Pensions from INPS
Self-employed and Business income	Agricultural income	B3N Mixed-income (net of evasion) (Producers HH Sector NA)
	Farm income	D422 Withdrawals from income of quasi-corporations (HH sector NA)
	Self-employment income	D613CNAS Self-employed social security contribution (-) (HH sector NA)
	Business income	
	Income from start-ups	
	Income with the option of separate taxation	
	Land income	
	Income from buildings	
	Income from partnerships	
	Losses from partnerships (-)	
	Rental income (From cedolare secca)	
	Income from other miscellaneous events	
	Taxes paid in advantageous regimes (+)	
	Social security contributions (-)	
	Investments income (revalued)	Investments income (revalued)
	Financial capital gain (revalued)	Financial capital gain (revalued)

Table A.5: Numeartor variables, Alvaredo and Pisano (2010) vs Our Benchmark definition

Income category	*Alvaredo and Pisano (2010)*	*Our Benchmark*
Wages & Pensions	Wages	Wages
	Income from employed activities or similar	Income from employed activities or similar
	Pensions	Pensions
	Income with the option of separate taxation	
		Other social security income
		Benefits
Self-employed and Business income	Agricultural income	Agricultural income
	Farm income	Farm income
	Self-employment income	Self-employment income
	Business income	Business income
	Income from start-ups	Income from start-ups
		Income with the option of separate taxation
		Land income
		Income from buildings
		Income from partnerships
		Losses from partnerships (-)
		Rental income (From cedolare secca)
		Income from other miscellaneous events
		Taxes paid in advantageous regimes (+)
		Social security contributions (-)
Capital Income	Investments income (revalued)	Investments income (revalued)
	Financial capital gain	Financial capital gain (revalued)
	Income from partnerships	
	Losses from partnerships (-)	
	Land income	
	Income from buildings	
	Income from other miscellaneous events	

Table A.6: Denominator variables, Alvaredo and Pisano (2010) vs Our Benchmark definition

Income category	*Alvaredo and Pisano (2010)*	*Our Benchmark*
Wages & Pensions	D1 Compensation of employees (HH sector)	D1 Compensation of employees (HH sector)
	D611 Employers' actual social contributions (-) (Govt sector)	D611 Employers' actual social contributions (-) (HH sector)
	D613CE Employees' actual social contributions (-) (Govt sector)	D613CE Employees' actual social contributions (-) (HH sector)
	IVSI Pensions from INPS	IVSI Pensions from INPS
Self-employed and Business income	D4Q Income transferred to consumers household (1/2) (HH sector)	B3N Mixed-income (net of evasion) (Producers HH Sector)
		D422 Withdrawals from income of quasi-corporations (HH sector)
	D613CNAS Self-employed social security contribution (-) (Govt sector)	D613CNAS Self-employed social security contribution (-) (HH sector)
Capital Income	Investments income (revalued)	Investments income (revalued)
	Financial capital gain	Financial capital gain (revalued)
	Income from partnerships	
	Losses from partnerships (-)	
	Land income	
	Income from buildings	
	Income from other miscellaneous events	

B Top income group in IRPEF tabulation

Table B.1: Income Tax Tabulation for San Demetrio Corone (Calabria) in 2021

Income bracket	Tax payers	Total income - Average in euro
Less or equal to 0		
From 0 to 10,000 euro	1,012	5,117
From 10,000 to 15,000 euro	412	12,105
From 15,000 to 26,000 euro	444	19,960
From 26,000 to 55,000 euro	218	34,016
From 55,000 to 75,000 euro	20	62,524
From 75,000 to 120,000 euro	10	90,252
More than 120,000 euro	5	177,549

Unfortunately, tax tabulations at the municipality level lack the level of detail present in tabulations for regions and for the entire country. Municipalities have only 7 income brackets, as described in Section 2.4, which limits the precision of income distribution estimates above the top 1% (see Table B.1 as reference). The top 1% of the local income distribution is, in fact, represented only in the last income brackets of each Inner Area group. This means that to estimates income shares for the top 0.1% will require to extrapolate the pareto coefficients based on the last available bracket which, in turn, would lead to very noisy results. Consequently, we only present estimates for the top 1% when focusing on municipalities.

In contrast, for Italy and other regions, the presence of 33 income brackets enables us to directly capture the average income and shares above the top 0.1%, allowing us to interpolate among brackets for the most accurate results in terms of income shares, averages, and thresholds (see Table B.2 and B.3 as reference).

Table B.2: Income Tax tabulation for Region Campania in 2021

Income bracket	Tax payers	Wage income Freq.	Wage income - Average in euro	Total income - Average in euro
minore di -1,000	157			-7,363
da -1,000 a 0	114			-374
zero	109,879	7	12,877	0
da 0 a 1,000	227,365	81,630	459	419
da 1,000 a 1,500	60,509	32,837	1,205	1,241
da 1,500 a 2,000	52,114	30,379	1,690	1,750
da 2,000 a 2,500	49,412	28,635	2,165	2,259
da 2,500 a 3,000	46,007	27,622	2,640	2,750
da 3,000 a 3,500	40,710	25,721	3,117	3,253
da 3,500 a 4,000	40,526	25,465	3,592	3,752
da 4,000 a 5,000	81,640	52,202	4,315	4,511
da 5,000 a 6,000	84,331	53,370	5,272	5,512
da 6,000 a 7,500	243,058	84,522	6,460	6,778
da 7,500 a 10,000	258,390	152,040	8,387	8,723
da 10,000 a 12,000	200,520	105,832	10,484	10,978
da 12,000 a 15,000	244,680	134,082	12,815	13,471
da 15,000 a 20,000	377,468	226,836	16,754	17,480
da 20,000 a 26,000	409,116	267,130	21,727	22,774
da 26,000 a 29,000	154,635	101,312	25,792	27,448
da 29,000 a 35,000	222,500	141,590	29,272	31,757
da 35,000 a 40,000	104,050	65,033	33,441	37,270
da 40,000 a 50,000	94,566	55,820	38,355	44,077
da 50,000 a 55,000	22,027	12,943	44,185	52,316
da 55,000 a 60,000	15,717	8,952	47,807	57,386
da 60,000 a 70,000	23,835	13,572	53,503	64,693
da 70,000 a 75,000	9,118	5,013	58,990	72,435
da 75,000 a 80,000	8,350	4,680	63,290	77,414
da 80,000 a 90,000	12,730	7,383	68,848	84,669
da 90,000 a 100,000	8,761	4,774	73,502	94,681
da 100,000 a 120,000	10,818	5,473	80,268	108,861
da 120,000 a 150,000	7,527	3,708	93,006	132,688
da 150,000 a 200,000	4,686	2,360	117,734	170,222
da 200,000 a 300,000	2,446	1,154	146,795	237,794
oltre 300,000	1,519	726	494,901	611,825

Table B.3: Income Tax tabulation in Italy in 2021

Income bracket	Tax payers	Wage income Freq.	Wage income - Average in euro	Total income - Average in euro
minore di -1,000	2,836	83	5,964	-8,211
da -1,000 a 0	1,419	38	2,632	-432
zero	1,018,161	61	7,148	0
da 0 a 1,000	2,423,075	808,196	447	424
da 1,000 a 1,500	602,392	304,937	1,193	1,241
da 1,500 a 2,000	501,453	282,914	1,673	1,748
da 2,000 a 2,500	454,213	258,566	2,142	2,253
da 2,500 a 3,000	421,761	245,515	2,615	2,750
da 3,000 a 3,500	381,687	231,055	3,090	3,251
da 3,500 a 4,000	377,472	229,388	3,563	3,752
da 4,000 a 5,000	747,317	455,548	4,278	4,510
da 5,000 a 6,000	756,227	460,209	5,224	5,510
da 6,000 a 7,500	2,167,195	727,624	6,412	6,791
da 7,500 a 10,000	2,530,326	1,392,664	8,376	8,752
da 10,000 a 12,000	2,163,507	1,136,010	10,484	11,001
da 12,000 a 15,000	3,125,660	1,635,256	12,818	13,504
da 15,000 a 20,000	5,458,820	2,973,055	16,749	17,536
da 20,000 a 26,000	6,672,974	4,240,531	21,813	22,815
da 26,000 a 29,000	2,496,341	1,611,832	25,803	27,440
da 29,000 a 35,000	3,411,822	2,169,024	29,316	31,735
da 35,000 a 40,000	1,627,028	1,016,794	33,627	37,287
da 40,000 a 50,000	1,636,649	1,004,589	39,097	44,259
da 50,000 a 55,000	438,665	267,544	45,488	52,358
da 55,000 a 60,000	324,034	193,680	49,274	57,393
da 60,000 a 70,000	462,356	269,893	54,696	64,652
da 70,000 a 75,000	174,857	99,702	60,433	72,438
da 75,000 a 80,000	149,556	85,111	64,275	77,427
da 80,000 a 90,000	231,295	133,054	69,679	84,704
da 90,000 a 100,000	161,768	90,035	76,405	94,708
da 100,000 a 120,000	201,101	107,061	84,576	108,986
da 120,000 a 150,000	151,705	80,011	100,922	133,173
da 150,000 a 200,000	108,026	58,136	129,161	171,148
da 200,000 a 300,000	67,408	36,076	175,989	238,944
oltre 300,000	48,212	26,839	483,624	607,857

C Municipalities Codes from IRPEF to Istat

Tax data at the municipality level are formatted differently than data aggregated for regions or for the whole country. In national and regional data we can observe 33 income brackets while only 8 are available at the municipality level. This is an issue when we focus on the very top of the income distribution. In fact, in municipality data we can only rely on one income bracket from €120,000 for the estrapolation estimation, while at the national level we have four additional brackets that gives us the ability to interpolate rather than extrapolate information on the very top of the income distribution. Despite this precision issue, we also need to match municipalities in IRPEF data and Istat data on population and to identify the aggregation within Inner Areas classification of the municipalities.

There are few issue in doing this matching procedure that has to be taken into account, namely i) the identity code assigned at each municipalities it is not always fixed through time, ii) one municipality can merge with others, iii) can change province and thus change its identity code, iv) Istat uses a more updated municipality code than MEF, and, v) some municipalities do exists in MEF data but do not exist in Istat data.[23] Moreover the Inner Areas classification also change thorough time, so we have 2 Inner Areas classification to take into account. The following is a list of all changes encoutered in the muncipality structure in Italy:

- In 2000 8100 municipalities
- In 2001 had 8101 with the new municipality Fonte Nuova
- In 2002 had 8100 municipalities merging together Sant'abbondio and Santa Maria R under San Siro
- No changes in 2003
- In 2004 had 8101 , with the new Baranzate detaching from Bollate
- No changes in 2005, 2006, 2007
- In 2008 there were 8094 municipalities and a major revision of the code identifiers. In 2008 MEF changed 238 code identifiers. We match them using the name of the municipalities. We remain with 10 unmatched municipality from 2007 and 3 from 2008. The following municipalities are unmatched from 2007 to 2008:
  - Bezzecca
  - Bleggio Inferiore
  - Campolongo al Torre
  - Concei
  - Lonato
  - Pieve Di Ledro

[23] There exist one municipality in MEF data that did not exist for Istat until 2017

  - Santa Teresa Di Gallura
  - Tapogliano
  - Tiarno Di Sopra
  - Tiarno Di Sotto

- Moreover there have been the following changes in code identifiers from 2007 to 2008:

  - Tapogliano and Campolongo Al Torre merged in new municipality Campolongo Tapogliano.
  - Bezzecca, Concei, Pieve Di Ledro, Tiarno Di Sotto, Tiarno Di Sopra, Molina Di Ledro merged in the new municipality Ledro which takes the same identification code of Molina Di Ledro in MEF data
  - Lonato changed name in Lonato Del Garda and changed identification code.
  - Bleggio Inferiore merged with Lomaso and created new municipality
  - Comano Terme but kept the same identification code of Lomaso in MEF data
  - Santa Teresa Di Gallura changed province and thus changed the identification code.

- In 2009 there have been 8094 municipalities:

  - Comano Terme and Ledro changed the identification code

- In 2010 there have been 8092 municipalities:

  - Consiglio Di Rumo, Gravedona and Germasino merged to the new municipality Gravedona Ed Uniti

- In 2011 there have been no changes
- In 2012 there have been 8072 municipalities. There are 37 unmatched municipality from 2011 to 2012 and other 17 unmatched from 2012 to 2011:

  - Bazzano, Castello Di Serravalle, Crespellano, Monteveglio, Savigno enters in the new municipality Valsamoggia
  - Casciana Terme, Lari enters in the new municipality Casciana Terme Lari
  - Castel Colonna, Monterado, Ripe enters in the new municipality Trecastelli
  - Castelfranco Di Sopra, Pian Di Sco enters in the new municipality Castelfranco Piandisco'
  - Colbordolo, Sant'angelo In Lizzola enters in the new municipality Vallefoglia
  - Crespina, Lorenzana enters in the new municipality Crespina Lorenzana
  - Fabbriche Di Vallico, Vergemoli enters in the new municipality Fabbriche Di Vergemoli
  - Figline Valdarno, Incisa In Val D'Arno enters in the new municipality Figline E Incisa Valdarno
  - Lari enters in the new municipality Casciana Terme Lari

  - Massa Fiscaglia, Migliarino, Migliaro enters in the new municipality Fiscaglia
  - Montoro Inferiore, Montoro Superiore enters in the new municipality Montoro
  - Poggio Berni, Torriana enters in the new municipality Poggio Torriana
  - Pratovecchio, Stia enters in the new municipality Pratovecchio Stia
  - Quero, Vas enters in the new municipality Quero Vas
  - Rivignano, Teor enters in the new municipality Rivignano Teor
  - San Piero A Sieve, Scarperia enters in the new municipality Scarperia E San Piero
  - Sissa, Trecasali enters in the new municipality Sissa Trecasali

- In 2013 there have been 8058 municipalities. With 24 unmatched from 2012 to 2013 and 10 unmatched from 2013 to 2012:

  - Bastida De' Dossi, Cornale enters in the new municipality Cornale E Bastida
  - Borgoforte, Virgilio enters in the new municipality Borgo Virgilio
  - Brembilla, Gerosa enters in the new municipality Val Brembilla
  - Castellavazzo enters in municipality Longarone but Longarone changes the identification code.
  - Civenna enter in the already existing municipality of Bellagio but Bellagio changes the identification code.
  - Drezzo, Gironico, Pare' enters in the new municipality Colverde
  - Lenno, Mezzegra, Ossuccio, Tremezzo enters in the new municipality Tremezzina
  - Maccagno, Pino Sulla Sponda Del Lago Maggiore, Veddasca enters in the new municipality Maccagno Con Pino E Veddasca
  - Valsecca enter in the already existing municipality of Sant'Omobono Terme but change Sant'Omobono Terme changes the identification code.
  - Verderio Inferiore, Verderio Superiore enters in the new municipality Verderio

- In 2014 there have been 8048 municipalities. With 16 unmatched from 2013 to 2014 and 6 unmatched from 2014 to 2013:

  - Arzene, Valvasone enters in the new municipality Valvasone Arzene
  - Bersone, Daone, Praso enters in the new municipality Valdaone
  - Coredo, Smarano, Taio, Tres, Vervo' enters in the new municipality Predaia
  - Dorsino, San Lorenzo In Banale enters in the new municipality San Lorenzo Dorsino
  - Giuncugnano, Sillano enters in the new municipality Sillano Giuncugnano
  - Perego, Rovagnate enters in the new municipality La Valletta Brianza

- In 2015 there have been 8000 municipalities. With 76 unmatched from 2014 to 2015 and 27 from 2015 to 2014:

  - Amblar, Don enters in the new municipality Amblar-Don
  - Bolbeno, Zuclo enters in the new municipality Borgo LARES
  - Bondo, Breguzzo, Lardaro, Roncone enters in the new municipality Sella Giudicarie

  - Bosentino, Centa San Nicolo', Vattaro, Vigolo Vattaro enters in the new municipality Altopiano Della Vigolana
  - Brione (Trento), Cimego, Condino enters in the new municipality Borgo Chiese
  - Busana, Collagna, Ligonchio, Ramiseto enters in the new municipality Ventasso
  - Calavino, Lasino enters in the new municipality Madruzzo
  - Cembra , Lisignago enters in the new municipality Cembra Lisignago
  - Corteolona, Genzone enters in the new municipality Corteolona E Genzone
  - Crosa enters in already existing municipality Lessona but Lessona changes identification code
  - Cunevo, Flavon, Terres enters in the new municipality Conta'
  - Dare', Vigo Rendena, Villa Rendena enters in the new municipality Porte Di Rendena
  - Dimaro, Monclassico enters in the new municipality Dimaro Folgarida
  - Farra D'alpago, Pieve D'alpago, Puos D'alpago enters in the new municipality Alpago
  - Faver, Grauno, grumes, Valda enters in the new municipality Altavalle
  - Fiera Di Primiero, Siror, Tonadico, Transacqua enters in the new municipality Primiero San Martino Di Castrozza
  - Forno Di Zoldo, Zoldo Alto enters in the new municipality Val Di Zoldo
  - Granaglione, Porretta Terme enters in the new municipality alto reno Terme
  - Ivano Fracena , Strigno, Spera, Villa Agnedo enters in the new municipality Castel Ivano
  - Menarola enter in the already existing municipality of Gordona
  - Montagne , Preore , Ragoli enters in the new municipality Tre Ville
  - Monte Colombo, Montescudo enters in the new municipality Montescudo-Monte Colombo
  - Nanno, Tassullo, Tuenno enters in the new municipality Ville D'anaunia
  - Padergnone, Terlago, Vezzano enters in the new municipality Vallelaghi
  - Pieve Di Bono, Prezzo enters in the new municipality Pieve Di Bono-Prezzo
  - Polesine Parmense, Zibello enters in the new municipality Polesine Zibello
  - Prestine enter in the already existing municipality of Bienno
  - Quittengo, San Paolo Cervo enters in the new municipality Campiglia Cervo but Campiglia Cervo changes identification code
  - Seppiana, Viganella enters in the new municipality Borgomezzavalle

- In 2016 had 7979 municipalities. With 31 unmatched from 2015 to 2016 and 10 unmatched from 2016 to 2015:

  - Abetone, Cutigliano enters in the new municipality Abetone Cutigliano
  - Acquacanina enter in the already existing municipality of Fiastra
  - Barchi, Orciano Di Pesaro, Piagge, San Giorgio Di Pesaro enters in the new municipality Terre Roveresche

  - Casole Bruzio, Pedace, Serra Pedace, Spezzano Piccolo, Trenta enters in the new municipality Casali Del Manco
  - Cavallasca enter in the already existing municipality of San Fermo Della Battaglia
  - Felonica enter in the already existing municipality of Sermide
  - Fiordimonte, Pievebovigliana enters in the new municipality Valfornace
  - Grancona, San Germano Dei Berici enters in the new municipality Val Liona
  - Lanzo D'Intelvi, Pellio Intelvi, Ramponio Verna enters in the new municipality Alta Valle Intelvi
  - Mirabello, Sant'Agostino enters in the new municipality Terre Del Reno
  - Montemaggiore Al Metauro, Saltara, Serrungarina enters in the new municipality Colli Al Metauro
  - Piteglio, San Marcello Pistoiese enters in the new municipality San Marcello Piteglio
  - San Giovanni D'asso enter in the already existing municipality of Montalcino but Montalcino changes identification code
  - Selve Marcone enter in the already existing municipality of Pettinengo

- In 2017 there have been 7954 municipalities. With 43 unmatched from 2016 to 2017 and 19 unmatched from 2017 to 2016:

  - Alluvioni Cambio', Piovera enters in the new municipality Alluvioni Piovera
  - Barbarano Vicentino, Mossano enters in the new municipality Barbarano Mossano
  - Breia, Cellio enters in the new municipality Cellio Con Breia
  - Camairago, Cavacurta enters in the new municipality Castelgerundo
  - Caminata, Nibbiano, Pecorara enters in the new municipality Alta Val Tidone
  - Carpasio, Montalto Ligure enters in the new municipality Montalto Carpasio
  - Casasco D'Intelvi, Castiglione D'Intelvi, San Fedele Intelvi enters in the new municipality Centro Valle Intelvi
  - Gavazzana enter in the already existing municipality of Cassano Spinola but Cassano Spinola changes identification code
  - Corigliano Calabro, Rossano enters in the new municipality Corigliano-Rossano
  - Fiumicello, Villa Vicentina enters in the new municipality Fiumicello Villa Vicentina
  - Introzzo, Tremenico, Vestreno enters in the new municipality Valvarrone
  - Laterina, Pergine Valdarno enters in the new municipality Laterina Pergine Valdarno
  - Ligosullo, Treppo Carnico enters in the new municipality Treppo Ligosullo
  - Megliadino San Fidenzio, Saletto, Santa Margherita D'Adige enters in the new municipality Borgo Veneto
  - Pieve Di Coriano, Revere, Villa Poma enters in the new municipality Borgo Mantovano
  - Pozza Di Fassa, Vigo Di Fassa enters in the new municipality Sen Jan Di Fassa
  - Rima San Giuseppe, Rimasco enters in the new municipality Alto Sermenza
  - Rio Marina, Rio Nell'Elba enters in the new municipality Rio

  - Sabbia enter in the already existing municipality of Varallo
  - Sappada changes region from Friuli-Venezia Giulia to Veneto and thus changes identification code

- In 2018 there have been 7915 municiplaities and there have been another major change in identification code. Originally we match only 7734 municipalities from 2017 to 2018. We match by name of municipalities other 156 entities. We are left with the following 65 unmatched municipalities from 2017 to 2018 and 25 from 2018 to 2017 that we match by hand:

  - Acquarica Del Capo, Presicce enters in the new municipality Presicce-Acquarica
  - Alice Superiore, Lugnacco, Pecco enters in the new municipality Val Di Chy
  - Auditore, Sassocorvaro enters in the new municipality Sassocorvaro Auditore
  - Barberino Val D'Elsa, Tavarnelle Val Di Pesa enters in the new municipality Barberino Tavarnelle
  - Berra, Ro enters in the new municipality Riva Del Po
  - Bigarello enter in the already existing municipality of San Giorgio Di Mantova who changes name in San Giorgio Di Bigarello but kept the same identification code
  - Borgofranco Sul Po, Carbonara Di Po enters in the new municipality Borgocarbonara
  - Ca' D'Andrea enter in the already existing municipality of Torre De' Picenardi
  - Cadrezzate, Osmate enters in the new municipality Cadrezzate Con Osmate
  - Cagno, Solbiate enters in the new municipality Solbiate Con Cagno
  - Camo Santo enter in the already existing municipality of Stefano Belbo
  - Campolongo Sul Brenta, Cismon Del Grappa, San Nazario, Valstagna enters in the new municipality Valbrenta
  - Canevino, Ruino , Valverde enters in the new municipality Colli Verdi
  - Castellar enter in the already existing municipality of Saluzzo
  - Cavaglio-Spoccia, Cursolo-Orasso , Falmenta enters in the new municipality Valle Cannobina
  - Cerreto Castello, Quaregna enters in the new municipality Quaregna Cerreto
  - Conco , Lusiana enters in the new municipality Lusiana Conco
  - Crespano Del Grappa, Paderno Del Grappa enters in the new municipality Pieve Del Grappa
  - Cuccaro Monferrato, Lu enters in the new municipality Lu E Cuccaro Monferrato
  - Drizzona, Piadena enters in the new municipality Piadena Drizzona
  - Formignana , Tresigallo enters in the new municipality Tresignana
  - Gattico, Veruno enters in the new municipality Gattico-Veruno
  - Lentiai, Mel, Trichiana enters in the new municipality Borgo Valbelluna
  - Mason Vicentino, Molvena enters in the new municipality Colceresa
  - Meugliano, Trausella, Vico Canavese enters in the new municipality Valchiusa
  - Mezzani, Sorbolo enters in the new municipality Sorbolo Mezzani
  - Mosso, Soprana, Soprana, Valle Mosso enters in the new municipality Valdilana

  - Nave San Rocco, Zambana enters in the new municipality Terre D'Adige
  - Riva Valdobbia enter in the already existing municipality of Alagna Valsesia
  - Valmala enter in the already existing municipality of Busca
  - Vermezzo, Zelo Surrigone enters in the new municipality Vermezzo Con Zelo

- In 2019 there have been 7904 municipalities. With 14 unmatched from 2018 to 2019 and 3 unmatched from 2019 to 2018:

  - Brez, Cagno', Cloz, Revo', Romallo enters in the new municipality Novella
  - Carano, Daiano, Varena enters in the new municipality Ville Di Fiemme
  - Castelfondo, Fondo, Malosco enters in the new municipality Borgo D'Anaunia
  - Faedo enter in the already existing municipality of San Michele All'Adige
  - Montecicardo enter in the already existing municipality of Pesaro
  - Vendrogno enter in the already existing municipality of Bellano

- In 2020 there were the following changes in code idntifiers:

  - Carano, Daiano e Varena enter in the new municipality Ville di Fiemme
  - Montecopiolo changes province and thus changes identity code
  - Sassofeltrio changes province and thus changes identity code
  - Brez, Cagnò, Cloz, Revò, Romallo enter in the new municipality Novella
  - Castelfondo, Fondo e Malosco enter in the new municipality Borgo d'Anaunia
  - Vendrogno enters in already existing municipality of Bellano
  - Montecicardo enters in already existing municipality of Pesaro
  - Faedo enters in already existing municipality of San Michele all'Adige

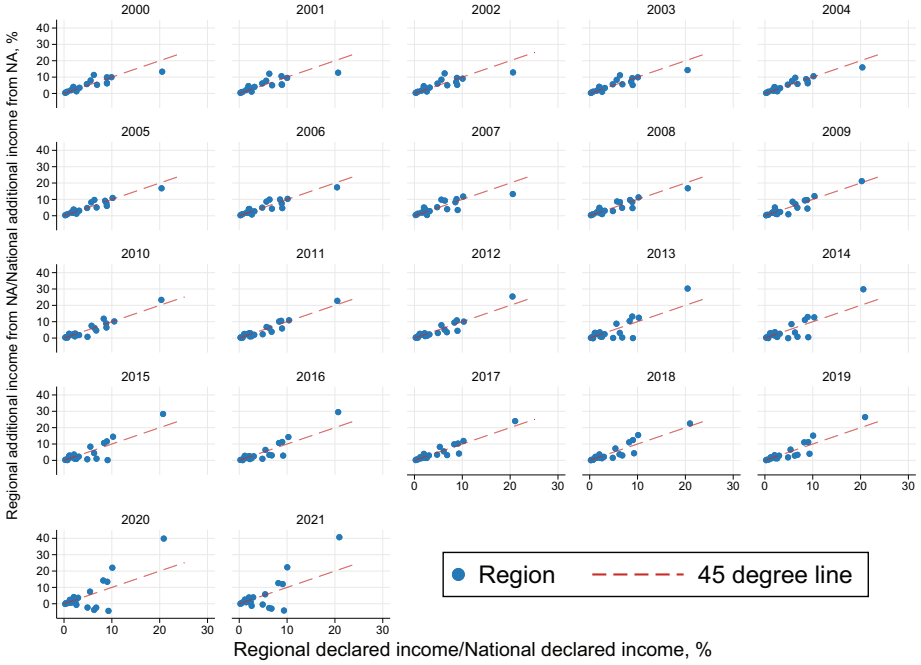
- In 2021 there were the following changes from MEF identification code to Istat identification code:

  - Municipalities of Sassofeltrio and Montecopiolo changed province thus changed identity code
  - new municipality of Misiliscemi is created in mef but not yet in Istat data

Data for Inner Areas have been produced for 2012 and then have been updated in 2014 but they both use the same 8092 municipalities.

We thus use only the 2014 classification of 8092 municipalities which get the same identification codes of MEF 2010. Therefore for all the other we merge the municipalities as they are in 2010 and assign the relative classification of Inner Areas. As a general rule, we keep the same Inner Area classification to the newly created municipality. This means that if two or more municipalities are merging in a new entity, we assign to the new entity the highest Inner Area classification from A to F. If a new municipaliy is created as a division of an existing municipality rather than merging, we keep the same classification of the old municipality to the new entity.

Figure C.1: Checking distributional assumption of undeclared income



C.1 Denominator checks

In the absence of specific external data sources, such as National Accounts, derived at the municipality level to estimate external fiscal income, the total fiscal income at the regional level can be used to calculate the expected fiscal income of the municipality. We assume that the total fiscal income defined at the regional level is distributed among the municipalities in the same proportion as the distribution of their regional declared income. This means that each municipality's share of the total regional reported income is computed and used to allocate the estimated fiscal income to each municipality. This approach assumes that the proportion of declared income and fiscal income is consistent within the region and that each municipality's fiscal income is proportional to its declared income. A similar approach can be taken at the regional level to test the validity of this assumption. First, we compute the share of the total national declared income held by each region. Then we calculate the difference between reported income and total fiscal income (i.e., the income tax-gap) at the regional and national levels. Thus, we compute how the national income tax-gap is distributed across regions. By plotting the share of declared income and the share of the income tax-gap for each year, it is possible to determine the correlation between the distribution of declared income and the difference between reported income and total fiscal income across regions. Suppose the results of this analysis show a high correlation between declared income and

the income tax-gap across regions. In that case, the assumption made at the municipality level is likely valid. However, if the correlation is low, the assumption may not hold, and alternative methods may be needed to estimate the fiscal income of the municipality. In Figure C.1, we show the results of this analysis which uncovered a high correlation in every available year. Only 2020 and 2021 have a lower level of correlation, although the R^2 is still above 0.90, while for all other years, the R^2 is above 0.96. Therefore, it is reasonable to assume that the same proportion holds at the municipality level, and this method can be used to estimate the total fiscal income for each municipality.

D Top income shares in Italy and all regions

Table D.1: Top income shares, total adult population and total income in Italy, current prices

Year	*Top 10% income share*	*Top 1% income share*	*Top 0.1% income share*	*Total adult population, thousands*	*Total income, millions of €*
1976	26.43%	6.85%	1.6%	39,659	54,616
1977	27.15%	6.49%	1.55%	39,914	67,131
1978	26.89%	6.42%	1.53%	40,209	78,742
1979	27.11%	6.6%	1.59%	40,544	95,552
1980	26.97%	6.64%	1.63%	40,885	119,367
1981	26.34%	6.3%	1.5%	41,217	146,789
1982	26.2%	6.24%	1.48%	41,587	171,703
1983	26.01%	6.16%	1.42%	41,981	199,099
1984	26.66%	6.47%	1.53%	42,339	222,173
1985	26.98%	6.7%	1.62%	42,729	248,392
1986	27.33%	7.01%	1.73%	43,083	270,652
1987	28.19%	7.33%	1.82%	43,437	294,614
1988	28.7%	7.4%	1.77%	43,821	322,802
1989	29.18%	7.57%	1.84%	44,184	355,254
1990	28.96%	7.47%	1.82%	44,577	396,340
1991	28.87%	7.52%	1.83%	44,952	432,716
1992	29.79%	7.68%	1.85%	45,574	456,358
1993	29.79%	7.7%	1.87%	45,883	466,076
1994	29.68%	7.68%	1.89%	46,152	488,610
1995	29.75%	7.73%	1.96%	46,370	509,798
1998	31%	8.35%	2.28%	46,819	581,678
1999	31.6%	8.46%	2.33%	46,902	603,878
2000	32.02%	8.7%	2.44%	46,984	627,102
2001	32.86%	9.14%	2.64%	47,082	651,920
2002	32.69%	9.09%	2.66%	47,168	676,625
2003	32.95%	9.24%	2.62%	47,323	702,014
2004	32.34%	8.86%	2.48%	47,679	729,115
2005	32.81%	9%	2.49%	48,003	746,180
2006	33.32%	9.33%	2.87%	48,135	778,347

Table D.1: Top income shares, total adult population and total income in Italy, current prices

Year	*Top 10% income share*	*Top 1% income share*	*Top 0.1% income share*	*Total adult population, thousands*	*Total income, millions of €*
2007	33.31%	9.41%	2.97%	48,271	800,597
2008	33.72%	9.3%	2.47%	48,645	804,655
2009	33.98%	9.14%	2.42%	48,949	800,043
2010	34.24%	9.24%	2.76%	49,126	809,572
2011	34.2%	9.29%	2.81%	49,321	825,635
2012	34.09%	9.18%	2.75%	49,396	818,038
2013	34.77%	9.36%	2.78%	49,662	810,293
2014	35.58%	9.61%	2.93%	50,625	816,873
2015	35.57%	9.67%	2.99%	50,699	832,385
2016	35.28%	9.7%	3.09%	50,658	849,819
2017	35.46%	9.88%	3.18%	50,679	863,173
2018	35.43%	9.89%	3.21%	50,678	887,725
2019	35.14%	9.72%	3.14%	50,244	899,809
2020	36.06%	9.81%	3.07%	50,208	856,151
2021	35.93%	10.11%	3.31%	49,985	907,509

Table D.2: Top 10% income share, threshold and averages by regions in 2000 and 2021, current prices*

	Income share		*Threshold*		*Average income*	
Region	*2000*	*2021*	*2000*	*2021*	*2000*	*2021*
Italia	32.02%	35.93%	24,136	36,516	42,737	65,567
Piemonte	30.24%	32.8%	25,977	38,682	45,559	68,149
Valle D'Aosta	24.98%	32.39%	27,015	40,105	42,544	69,497
Liguria	29.42%	33.64%	26,503	39,897	43,674	68,861
Lombardia	32.84%	35.42%	27,956	43,323	53,626	83,301
Trentino Alto Adige	24.64%		26,406		45,749	
Prov. Autonoma Bolzano		31.17%		44,053		80,468
Prov. Autonoma Trento		31.23%		39,270		67,972
Veneto	30.08%	33.26%	24,138	38,155	43,378	68,792
Friuli-Venezia Giulia	27.97%	31.64%	24,872	38,729	43,124	66,691
Emilia-Romagna	28.2%	32.54%	26,233	41,023	47,237	72,383
Toscana	30.54%	33.66%	24,413	37,392	42,653	66,060
Umbria	27.49%	32.79%	22,621	33,930	37,536	58,666
Marche	30.53%	32.76%	22,451	34,282	37,903	60,543
Lazio	34.64%	37.64%	27,604	41,461	50,969	74,024
Abruzzo	29.12%	33.48%	22,239	32,583	34,264	52,945
Molise	30.26%	34.74%	20,918	31,440	31,143	48,823
Campania	33.85%	39.97%	21,326	30,834	32,892	49,189
Puglia	33.24%	36.1%	20,929	31,048	31,809	48,904
Basilicata	30.45%	34.55%	19,846	30,810	29,698	47,394
Calabria	33.68%	37.78%	19,343	29,646	29,555	44,634
Sicilia	34.89%	39.04%	21,048	30,773	32,510	48,215
Sardegna	32.46%	35.19%	21,609	31,798	32,686	50,808

* Note: percentiles, income share, thresholds and averages are calculated based on regional total income and regional adult population.

Table D.3: Top 1% income share, threshold and averages by regions in 2000 and 2021, current prices*

	Income share		*Threshold*		*Average income*	
Region	*2000*	*2021*	*2000*	*2021*	*2000*	*2021*
Italia	8.7%	10.11%	68,119	98,120	116,121	184,562
Piemonte	8.22%	9.19%	67,586	100,482	123,881	190,866
Valle D'Aosta	5.8%	8.31%	66,568	109,524	98,772	178,286
Liguria	7.46%	9.16%	67,871	101,602	110,774	187,607
Lombardia	9.56%	11.44%	84,106	123,383	156,207	268,979
Trentino Alto Adige	6.54%		74,874		121,481	
Prov. Autonoma Bolzano		9.06%		128,608		233,818
Prov. Autonoma Trento		8.33%		103,327		181,384
Veneto	8.1%	9.49%	69,167	103,253	116,748	196,374
Friuli-Venezia Giulia	7.19%	8.56%	68,380	98,270	110,896	180,373
Emilia-Romagna	7.51%	9.22%	73,846	108,423	125,721	205,033
Toscana	7.86%	9.2%	67,002	98,097	109,761	180,538
Umbria	6.86%	8.55%	58,737	89,435	93,697	153,026
Marche	7.8%	8.86%	60,521	92,703	96,819	163,798
Lazio	9.53%	10.57%	79,864	113,169	140,234	207,890
Abruzzo	7.05%	8.17%	54,602	81,007	82,893	129,183
Molise	7.02%	8.35%	49,044	77,131	72,251	117,392
Campania	8.28%	10.03%	54,398	77,606	80,425	123,421
Puglia	8.07%	8.74%	46,849	77,491	77,202	118,432
Basilicata	7.05%	8.38%	45,309	72,327	68,722	114,954
Calabria	7.85%	8.71%	44,988	69,771	68,868	102,964
Sicilia	8.24%	9.16%	51,257	76,079	76,788	113,124
Sardegna	7.59%	8.36%	51,306	78,977	76,453	120,711

* Note: percentiles, income share, thresholds and averages are calculated based on regional total income and regional adult population.

Table D.4: Top 0.1% income share, threshold and averages by regions in 2000 and 2021, current prices*

	Income share		*Threshold*		*Average income*	
Region	*2000*	*2021*	*2000*	*2021*	*2000*	*2021*
Italia	2.44%	3.31%	174,000	374,803	325,254	603,627
Piemonte	2.23%	2.96%	185,681	421,784	335,390	615,824
Valle D'Aosta	1.15%	2.66%	134,063	205,125	195,866	570,215
Liguria	1.99%	2.88%	156,807	400,968	295,510	589,413
Lombardia	2.77%	3.31%	242,649	626,227	452,132	778,455
Trentino Alto Adige	1.55%		177,584		288,472	
Prov. Autonoma Bolzano		2.39%		477,280		618,312
Prov. Autonoma Trento		2.6%		271,237		565,435
Veneto	2.13%	2.91%	176,773	430,301	307,190	601,974
Friuli-Venezia Giulia	1.91%	2.77%	161,316	287,040	295,004	584,562
Emilia-Romagna	2.02%	2.79%	185,890	450,349	338,071	621,538
Toscana	2.08%	2.97%	158,989	316,490	290,292	582,158
Umbria	1.69%	2.55%	133,496	206,010	230,319	456,979
Marche	1.89%	2.83%	133,502	190,599	235,200	523,594
Lazio	2.62%	3.3%	209,256	458,883	385,378	648,248
Abruzzo	1.7%	2.15%	110,335	186,229	200,521	340,387
Molise	1.37%	2.04%	108,102	152,085	140,564	287,391
Campania	1.94%	2.71%	117,445	170,707	188,748	333,889
Puglia	1.85%	2.14%	106,388	164,307	177,350	289,527
Basilicata	1.38%	2.17%	97,967	151,512	134,513	297,513
Calabria	1.68%	1.96%	95,540	139,437	147,332	232,061
Sicilia	1.75%	2.12%	108,377	155,449	162,817	261,542
Sardegna	1.7%	2.15%	106,817	162,389	170,751	310,237

* Note: percentiles, income share, thresholds and averages are calculated based on regional total income and regional adult population.

Table D.5: Top 10% income share, threshold and averages by macro regions, current prices

	Income shares			Threshold, €			Average income, €		
Year	*North*	*Center*	*South*	*North*	*Center*	*South*	*North*	*Center*	*South*
1999	30.03%	32.00%	33.26%	25,182.64	24,629.29	20,406.58	45,824.98	43,356.06	30,987.86
2000	30.46%	32.53%	33.32%	26,081.10	25,011.67	22,176.07	48,107.99	45,808.64	32,218.91
2001	31.57%	33.24%	34.04%	27,888.33	27,001.48	21,744.03	51,649.55	48,519.17	34,284.36
2002	31.50%	33.08%	33.61%	28,717.08	27,754.91	22,358.27	53,227.89	50,126.77	35,231.98
2003	31.84%	33.17%	34.07%	29,463.95	28,943.83	23,396.51	55,710.33	52,382.75	36,594.54
2004	30.95%	32.49%	34.13%	30,342.34	29,789.20	24,102.60	55,813.76	53,282.20	37,524.52
2005	31.32%	33.10%	34.58%	31,307.81	30,733.06	24,478.51	57,411.46	55,070.08	38,685.13
2006	31.95%	33.55%	34.97%	32,624.59	32,032.19	25,603.54	61,050.05	57,754.06	40,656.35
2007	31.89%	33.58%	34.97%	33,411.99	32,737.94	26,103.19	62,462.05	59,645.91	41,544.67
2008	32.19%	33.88%	35.79%	34,858.87	34,784.10	26,652.28	63,062.99	59,929.93	42,150.02
2009	32.10%	34.15%	36.76%	35,850.39	34,985.27	27,000.28	61,961.52	60,018.17	42,813.56
2010	32.22%	34.54%	37.36%	34,195.30	34,119.89	27,578.57	63,084.08	61,106.92	43,328.47
2011	32.30%	34.48%	37.09%	34,794.29	34,203.14	27,822.98	64,479.13	61,676.33	43,530.83
2012	32.16%	34.36%	37.28%	35,414.98	34,378.31	27,418.49	63,813.45	60,375.93	43,095.28
2013	32.81%	35.10%	38.22%	35,595.98	34,388.47	27,826.61	64,214.02	60,674.73	43,411.27
2014	33.33%	36.00%	38.95%	35,852.75	34,380.68	27,912.10	64,954.77	60,802.16	43,549.79
2015	33.47%	35.92%	38.92%	36,822.52	35,165.42	28,311.11	66,426.44	61,615.45	44,240.97
2016	33.07%	35.79%	38.74%	37,166.97	35,281.40	29,834.35	67,307.25	63,019.73	44,445.47
2017	33.20%	35.94%	39.00%	37,845.16	35,715.68	30,078.29	69,041.64	63,757.51	45,024.41
2018	33.39%	35.62%	38.56%	39,089.01	36,805.75	29,967.55	71,063.08	65,307.50	46,068.73
2019	33.07%	35.32%	38.01%	39,724.99	37,533.05	30,475.97	71,684.30	66,340.83	46,971.72
2020	34.09%	36.32%	38.27%	39,001.89	37,099.44	30,443.45	70,128.95	65,467.07	46,905.34
2021	34.07%	36.02%	37.60%	41,041.53	38,634.91	30,988.37	74,753.35	68,878.06	48,818.17

Table D.6: Top 1% income share, threshold and averages by macro regions, current prices

	Income shares			Threshold, €			Average income, €		
Year	*North*	*Center*	*South*	*North*	*Center*	*South*	*North*	*Center*	*South*
1999	8.21%	8.39%	7.73%	71,268.18	64,941.03	47,610.03	125,239.48	113,626.16	72,041.57
2000	8.45%	8.66%	8.00%	75,829.09	71,574.03	52,437.41	133,390.65	121,954.83	77,332.74
2001	9.09%	9.05%	8.31%	81,091.28	77,135.70	54,657.33	148,696.47	132,158.72	83,705.57
2002	9.08%	9.01%	8.08%	83,361.81	78,216.91	55,554.56	153,363.64	136,587.04	84,690.53
2003	9.36%	9.15%	8.21%	86,325.02	81,485.43	57,255.50	163,786.59	144,523.83	88,216.47
2004	8.84%	8.85%	8.18%	86,110.61	82,845.90	58,804.29	159,393.71	145,148.11	89,936.82
2005	8.98%	9.03%	8.28%	88,327.79	85,303.12	60,561.32	164,657.75	150,211.63	92,586.55
2006	9.39%	9.25%	8.55%	93,904.68	88,891.43	63,760.19	179,385.06	159,302.57	99,383.01
2007	9.43%	9.48%	8.59%	94,941.05	91,064.65	65,373.73	184,779.86	168,394.38	102,088.96
2008	9.27%	9.33%	8.57%	97,065.15	92,151.58	64,026.66	181,566.70	165,029.69	100,876.23
2009	9.00%	9.25%	8.67%	96,278.39	93,140.14	63,880.10	173,697.15	162,496.86	100,942.55
2010	9.15%	9.30%	8.82%	95,669.17	92,523.37	67,945.07	179,193.86	164,622.78	102,287.43
2011	9.19%	9.41%	8.77%	97,471.37	93,502.87	68,408.91	183,500.70	168,284.08	102,900.36
2012	9.03%	9.25%	8.84%	95,846.46	91,087.76	67,356.35	179,171.70	162,572.34	102,238.72
2013	9.19%	9.45%	9.04%	96,045.39	90,201.40	67,791.24	179,943.41	163,325.88	102,662.81
2014	9.45%	9.72%	9.23%	96,473.25	91,075.05	67,729.87	184,085.15	164,146.68	103,153.81
2015	9.57%	9.71%	9.17%	98,314.06	91,754.72	68,492.62	189,877.31	166,643.79	104,260.81
2016	9.55%	9.88%	9.08%	98,862.06	95,854.95	69,883.24	194,423.30	173,948.22	104,162.63
2017	9.78%	9.92%	9.22%	101,481.79	97,107.73	70,520.55	203,345.02	175,934.68	106,389.40
2018	9.89%	9.80%	9.08%	105,157.91	98,153.91	71,458.06	210,401.96	179,611.95	108,480.63
2019	9.69%	9.65%	8.92%	105,799.18	99,173.44	72,650.57	210,092.44	181,273.45	110,252.68
2020	9.77%	9.79%	8.98%	103,800.79	98,898.98	72,838.75	200,981.65	176,529.27	110,047.55
2021	10.17%	9.96%	9.09%	112,836.31	102,546.75	77,041.28	223,257.28	190,536.55	118,010.31

Table D.7: Top 0.1% income share, threshold and averages by macro regions, current prices

	Income shares			Threshold, €			Average income, €		
Year	*North*	*Center*	*South*	*North*	*Center*	*South*	*North*	*Center*	*South*
1999	2.24%	2.18%	1.75%	190,177.46	166,728.21	103,857.44	342,528.30	295,493.83	162,970.15
2000	2.35%	2.33%	1.79%	203,615.63	179,105.04	108,503.07	370,612.58	327,470.27	173,338.20
2001	2.44%	2.51%	1.91%	322,988.94	270,614.71	114,127.43	399,268.82	365,881.05	192,656.00
2002	2.76%	2.58%	1.88%	203,405.80	178,801.18	115,791.16	466,266.75	391,475.78	196,965.97
2003	3.01%	2.72%	1.96%	213,650.51	193,674.83	123,533.33	525,985.95	429,110.57	210,863.89
2004	2.76%	2.59%	1.95%	202,508.05	192,566.81	126,941.20	498,592.35	425,277.71	214,354.14
2005	2.87%	2.68%	1.95%	205,713.61	197,000.52	133,012.90	526,889.38	446,198.43	217,848.90
2006	3.06%	2.81%	2.08%	263,469.04	230,096.14	138,076.30	584,197.65	483,105.11	242,275.50
2007	3.12%	3.00%	2.15%	272,467.42	243,435.49	141,044.10	611,462.34	533,346.61	255,419.95
2008	2.23%	2.39%	2.09%	378,602.22	352,657.10	137,999.08	436,396.55	423,172.00	246,005.65
2009	2.20%	2.35%	2.04%	361,612.48	341,001.93	138,002.38	424,155.36	413,297.26	237,502.72
2010	2.80%	2.79%	2.06%	223,310.79	220,256.89	133,981.53	547,730.85	492,784.92	238,814.53
2011	2.85%	2.89%	2.03%	223,179.98	220,150.86	134,819.34	569,087.77	517,534.71	238,070.37
2012	2.77%	2.75%	2.07%	221,585.34	230,313.65	134,982.14	548,978.11	482,646.68	239,281.83
2013	2.83%	2.80%	2.12%	221,638.94	219,117.57	132,360.32	553,942.41	484,652.84	240,709.86
2014	3.00%	2.95%	2.19%	222,181.80	218,956.44	130,709.82	583,946.36	499,003.46	245,241.91
2015	3.09%	3.00%	2.20%	418,096.01	218,259.60	136,572.55	612,438.39	514,404.09	250,403.28
2016	3.12%	3.25%	2.16%	438,902.56	214,511.28	143,676.00	634,557.88	572,336.63	248,339.95
2017	3.19%	3.18%	2.23%	467,425.37	218,856.89	147,418.27	664,130.17	563,953.00	257,929.88
2018	3.17%	3.14%	2.20%	485,101.70	249,539.70	149,379.74	675,185.92	576,338.30	263,401.85
2019	3.10%	3.10%	2.17%	482,086.59	255,064.58	150,368.43	672,093.93	582,028.41	267,615.18
2020	3.06%	3.08%	2.14%	449,008.98	217,554.41	145,990.99	628,492.94	555,075.28	262,656.24
2021	3.14%	3.20%	2.28%	515,275.33	403,027.86	160,230.10	688,472.45	611,264.63	295,627.36

Table D.8: Top 1% income shares by Inner Areas

Year	A - Polo	B - Polo intercomunale	C - Cintura	D - Intermedio	E - Periferico	F - Ultraperiferico
2000	9.24%	7.89%	7.69%	7.24%	6.73%	6.50%
2001	9.98%	8.38%	8.16%	7.73%	7.28%	6.85%
2002	10.00%	8.22%	8.04%	7.56%	7.15%	6.69%
2003	10.23%	8.45%	8.27%	7.77%	7.39%	7.14%
2004	10.02%	8.02%	7.76%	7.40%	7.22%	6.76%
2005	10.17%	8.15%	7.86%	7.63%	7.18%	6.87%
2006	10.64%	8.34%	8.09%	7.80%	7.59%	7.43%
2007	10.74%	8.41%	8.17%	7.84%	7.56%	7.44%
2008	10.67%	8.34%	8.12%	7.87%	7.71%	7.72%
2009	10.44%	8.21%	7.95%	7.85%	7.77%	7.75%
2010	10.54%	8.31%	8.07%	7.99%	7.89%	7.82%
2011	10.62%	8.38%	8.07%	7.99%	7.92%	7.85%
2012	10.56%	8.22%	7.95%	7.96%	7.88%	7.78%
2013	10.80%	8.38%	8.11%	8.04%	7.97%	7.90%
2014	11.17%	8.61%	8.28%	8.22%	8.13%	8.10%
2015	11.25%	8.66%	8.39%	8.22%	7.91%	7.89%
2016	11.30%	8.64%	8.40%	8.22%	7.89%	7.92%
2017	11.31%	8.69%	8.33%	8.39%	8.30%	8.37%
2018	11.28%	8.69%	8.54%	8.40%	8.18%	8.03%
2019	11.17%	8.65%	8.37%	8.18%	8.03%	7.93%
2020	11.26%	8.67%	8.46%	8.35%	8.29%	8.12%
2021	11.33%	9.08%	8.78%	8.53%	8.35%	8.14%

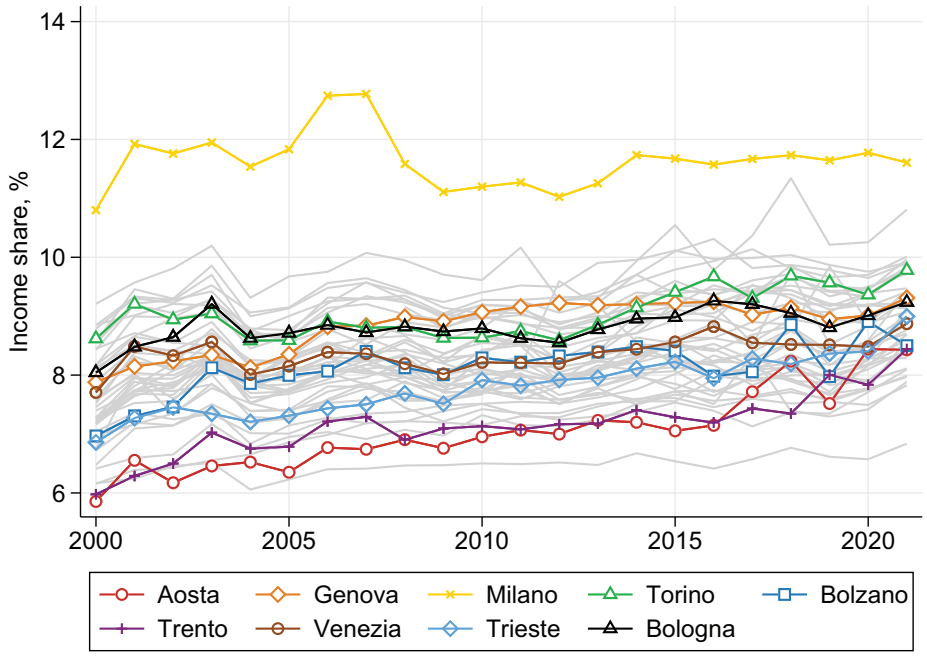
Table D.9: Top 1% threshold by Inner Areas, € current prices

Year	A - Polo	B - Polo intercomunale	C - Cintura	D - Intermedio	E - Periferico	F - Ultraperiferico
2000	84,924.24	58,919.54	59,529.80	50,689.38	42,478.04	39,559.30
2001	85,197.48	67,109.56	60,812.97	55,587.91	46,335.23	37,770.57
2002	86,514.53	68,871.87	68,800.85	56,330.59	48,562.68	38,203.58
2003	88,453.73	73,220.75	72,109.15	57,139.97	51,241.67	47,230.60
2004	88,255.93	71,990.91	74,941.34	58,189.09	52,023.16	40,699.91
2005	89,108.86	74,131.69	77,259.09	56,718.04	42,366.63	40,646.92
2006	100,443.97	75,232.87	76,331.55	64,148.70	55,689.45	52,666.42
2007	102,557.02	76,106.54	77,368.90	65,651.91	57,154.18	54,215.59
2008	121,564.87	76,875.89	77,717.30	68,896.34	60,777.87	51,432.08
2009	120,113.54	76,940.59	77,189.21	68,873.88	59,767.64	55,037.54
2010	128,702.44	77,518.20	77,829.89	69,958.22	62,316.67	53,521.49
2011	134,366.94	78,397.11	78,846.15	70,980.10	64,569.48	56,586.26
2012	126,464.31	77,546.86	78,150.23	69,983.43	63,373.69	57,226.06
2013	127,898.06	77,867.48	78,348.21	70,312.01	64,157.43	56,407.55
2014	126,431.06	77,989.65	78,632.74	70,551.55	64,804.06	57,531.61
2015	133,566.40	78,638.72	74,854.26	67,186.64	59,873.72	60,435.99
2016	139,772.49	74,034.83	74,569.26	68,226.67	60,380.86	60,649.69
2017	100,796.16	85,574.52	85,224.52	79,028.20	66,334.48	61,670.25
2018	157,175.81	82,326.60	81,713.42	74,498.08	68,594.49	64,548.45
2019	158,147.62	81,288.27	82,542.26	75,668.25	70,158.57	66,451.52
2020	153,233.58	80,983.96	82,261.92	75,509.62	69,987.07	65,489.73
2021	166,824.39	82,692.72	84,046.08	78,277.12	73,982.01	69,850.32

Table D.10: Top 1% average income by Inner Areas, € current prices

Year	A - Polo	B - Polo intercomunale	C - Cintura	D - Intermedio	E - Periferico	F - Ultraperiferico
2000	142,408.29	99,351.52	100,416.22	79,980.21	66,307.72	58,607.34
2001	160,321.70	109,639.95	110,225.01	87,981.96	73,606.09	63,611.55
2002	166,354.36	111,482.88	112,430.20	89,374.22	74,712.13	65,129.89
2003	176,315.70	117,895.96	119,839.93	94,718.24	79,185.87	71,857.42
2004	176,313.30	115,029.38	116,793.63	93,942.71	80,620.78	71,261.45
2005	183,198.04	118,198.35	119,729.89	97,975.08	81,124.30	73,423.52
2006	198,486.83	125,842.37	128,800.59	104,298.93	89,490.75	83,259.69
2007	205,689.90	129,588.93	133,241.60	107,887.10	91,623.06	85,894.07
2008	205,699.69	127,809.51	131,447.86	106,935.69	93,150.03	88,658.20
2009	199,559.69	124,265.30	126,485.34	105,331.07	93,322.48	88,537.89
2010	203,342.70	126,391.66	129,683.02	107,832.41	95,089.44	88,779.11
2011	207,076.62	129,247.86	132,343.48	110,066.04	97,443.69	90,970.46
2012	203,104.06	125,433.80	129,292.41	108,224.43	95,755.91	89,492.29
2013	204,207.16	125,896.57	130,001.05	107,857.35	96,030.70	90,535.33
2014	207,030.45	128,023.58	132,147.38	109,341.08	97,058.63	91,350.85
2015	211,369.56	131,400.29	136,584.72	111,408.00	96,442.11	90,573.91
2016	216,361.56	133,389.95	140,032.99	114,004.35	97,904.54	92,545.84
2017	220,656.73	135,514.83	140,970.65	117,300.68	103,235.88	97,825.08
2018	224,822.58	139,432.54	149,032.68	122,218.98	106,534.86	98,769.67
2019	225,927.34	141,871.64	149,810.43	122,489.85	107,926.84	100,188.82
2020	217,600.99	137,130.34	145,144.39	121,014.84	108,414.32	100,381.01
2021	232,441.67	152,699.96	160,136.99	132,226.43	116,995.64	108,021.61

Figure D.1: Income shares of the top 1% in northern provinces

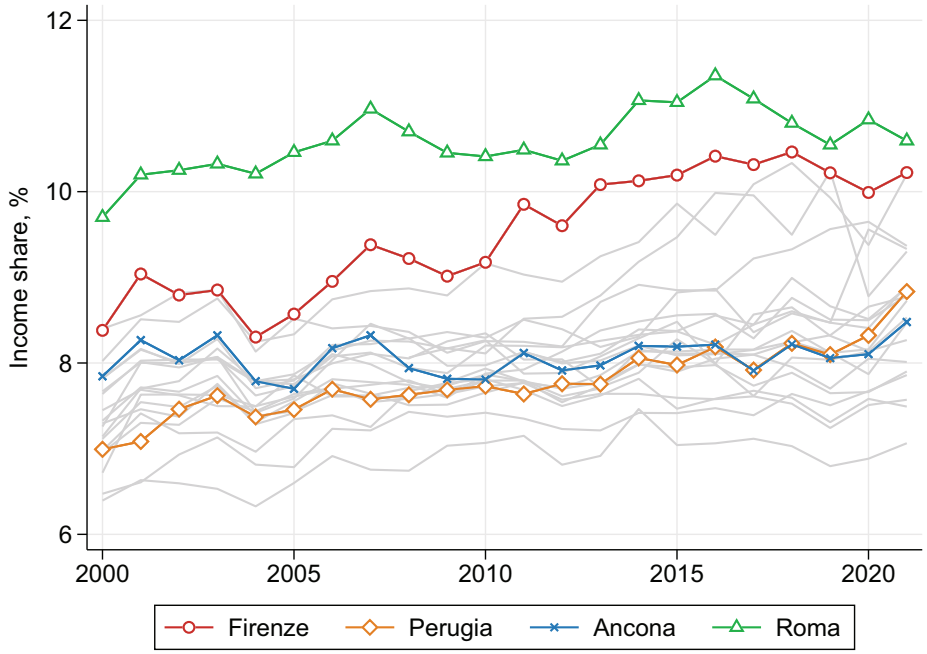


Note: Series in light gray represent all the provinces from the northern regions. Only the provinces of the regional capitals are highlighted in the figure.

D.1 Top income shares in provinces

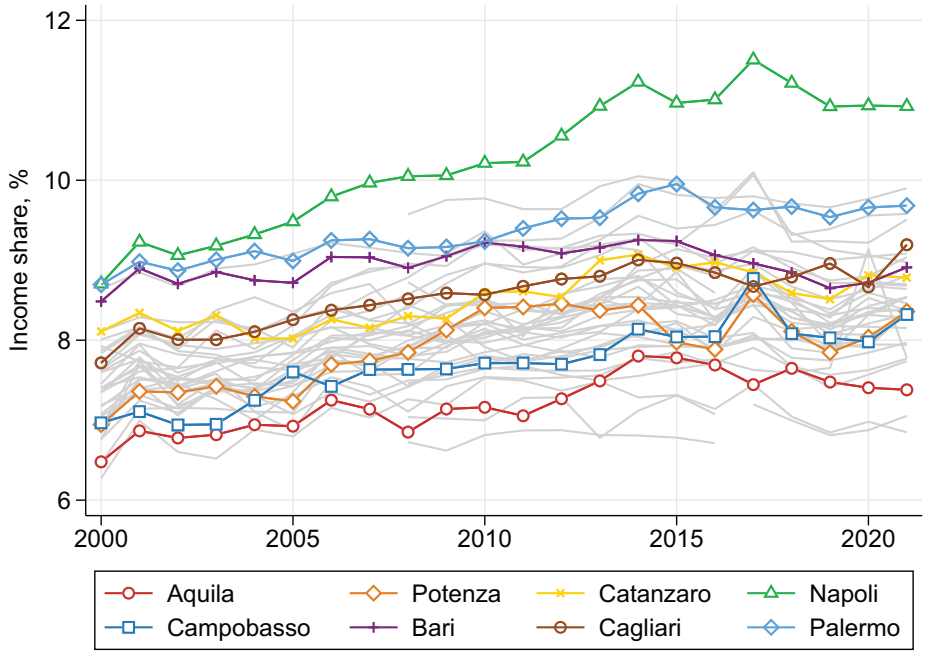
In Figure D.1, D.2, and D.3 we show the income shares for the top 1% in the provinces of the northern regions, central regions, and southern regions, respectively. Similar to the analysis for inner areas, we see that the provinces with the largest municipalities exhibit the highest levels of income concentration. The provinces of Milan, Florence, Rome, Naples, and Palermo, in fact, have the highest income shares for the top 1%. It is also worth noting that in terms of trends, almost all provinces show an increasing trend in income concentration, although the province of Milan has a stable trend, oscillating just below a 12% income share.

Figure D.2: Income shares of the top 1% in center provinces



Note: Series in light gray represent all the provinces from the center regions. Only the provinces of the regional capitals are highlighted in the figure.

Figure D.3: Income shares of the top 1% in southern provinces



Note: Series in light gray represent all the provinces from the southern regions. Only the provinces of the regional capitals are highlighted in the figure.

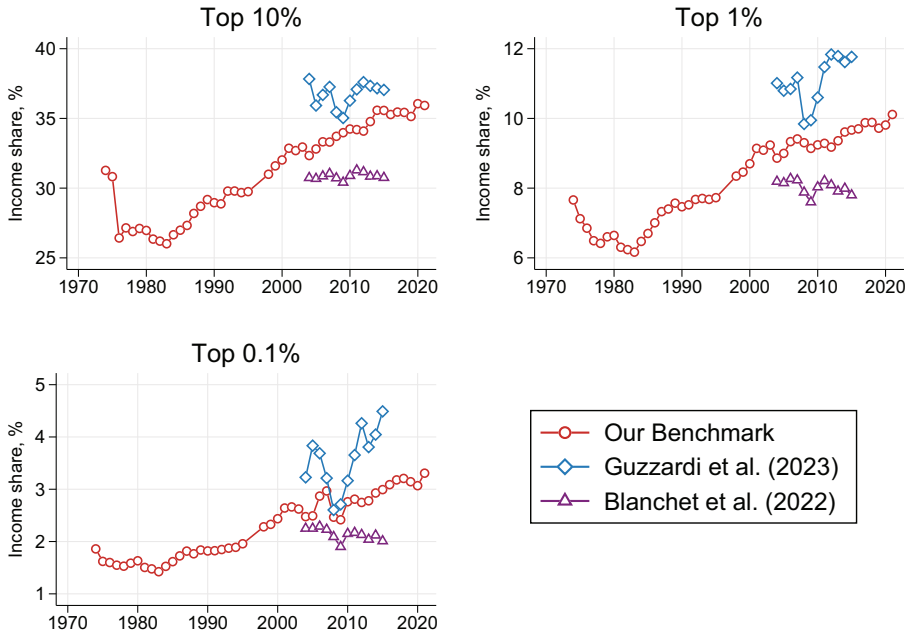
D.2 Comparison with Distributional National Accounts

Our benchmark income concentration series differ substantially from results based on Distributional National Accounts for Italy (Guzzardi et al., 2023; Blanchet et al., 2022), which include all income from Net National Income (see Figure D.4). The main differences lie in the fact that our benchmark series does not account for large evaded income, income from the public sector, retained earnings of corporations, and all capital income not included in tax data. Therefore, our total benchmark income and market income definitions are substantially lower than the total Net National Income used in Guzzardi et al. (2023) and Blanchet et al. (2022) (see Figure D.5 for a comparison of total income).

As a result, our benchmark concentration series appear substantially lower in level compared to the pre-tax national income series in Guzzardi et al. (2023), indicating that the income sources not included in our benchmark definition, but included in Guzzardi et al. (2023), are even more concentrated. This would explain the higher income concentration series found in Guzzardi et al. (2023).

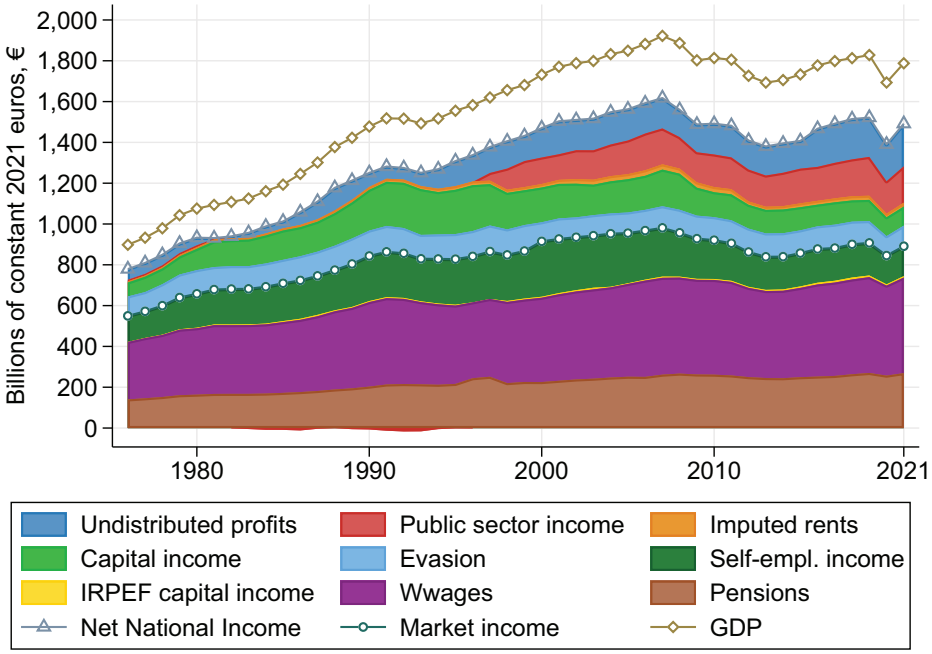
In contrast, the pre-tax national income series from Blanchet et al. (2022) is considerably lower than both our benchmark series and the one from Guzzardi et al. (2023) due to the "equal-split" assumption, which divides income equally among spouses. Consequently, even if all capital income is highly concentrated at the top of the income distribution as in Guzzardi et al. (2023), dividing all income equally within the households couple substantially reduces the concentration of pre-tax income.

Figure D.4: Top income shares with different methodologies



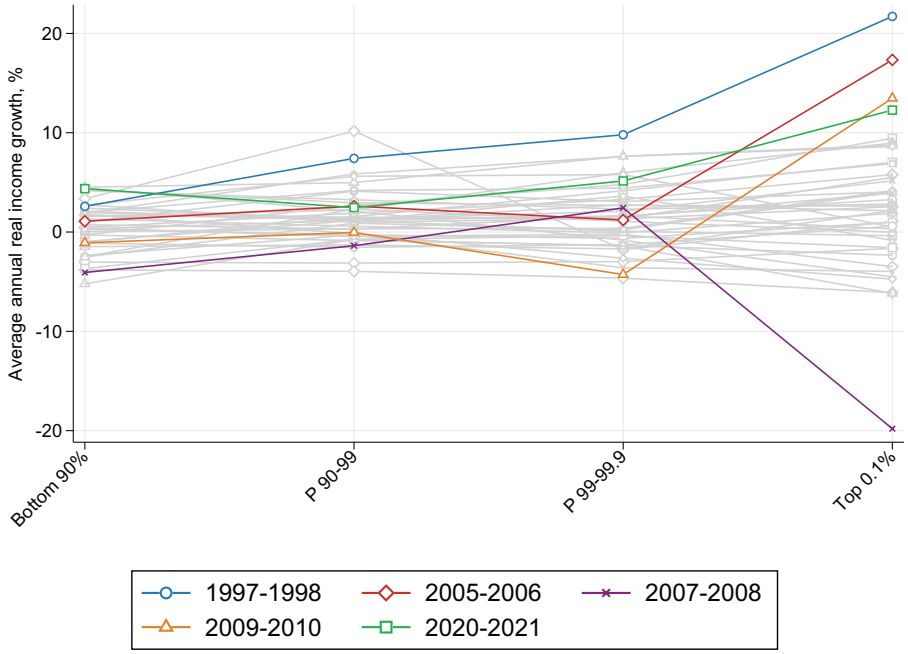
Note: Series from Guzzardi et al. (2023) are from their pre-tax national income definition at personal level; series from Blanchet et al. (2022) are from their pre-tax national income definition at equal-split level

Figure D.5: From Net National Income to market income



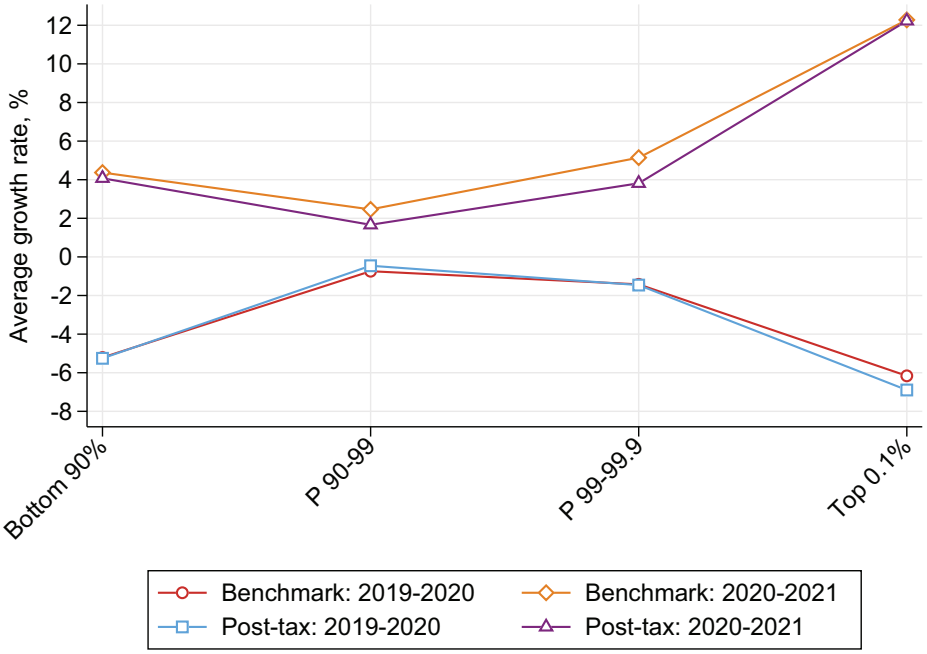
E Additional figures

Figure E.1: Annual growth of real income for selected income groups



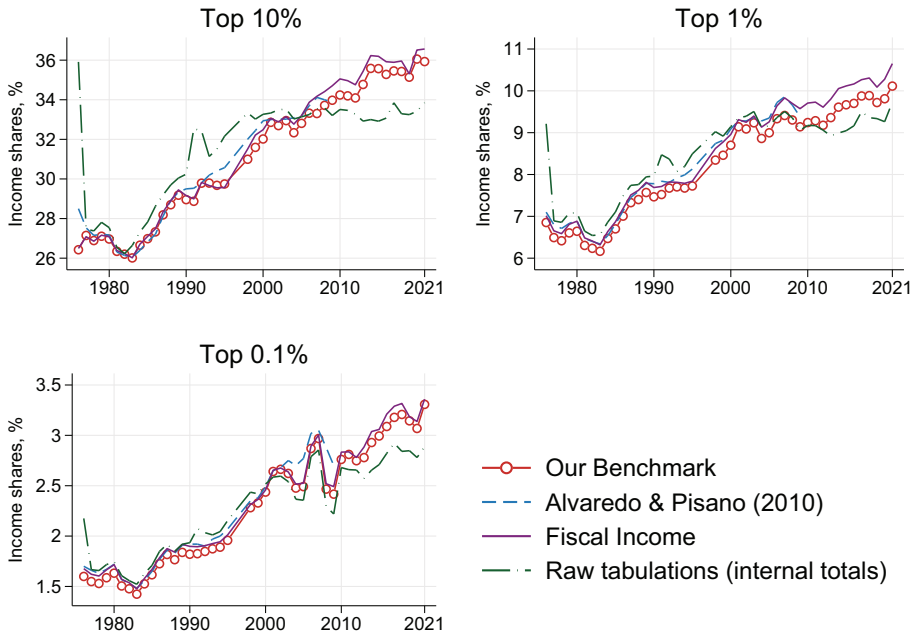
Note: Real growth is calculated in 2021 prices using NIC indexes released by the National Statistical Office

Figure E.2: Average annual growth of real income during the Covid-19 pandemic



Note: Real growth is calculated in 2021 prices using NIC indexes released by the National Statistical Office

Figure E.3: Comparison of top income shares



Note: "Raw tabulations (internal totals)" uses as denominator only the total income reported in tax return and for total populations only the people filing tax returns. Fiscal income series is effectively an update of the work by Alvaredo and Pisano (2010).

Figure E.4: Top 1% income shares across macro regions for different income concept

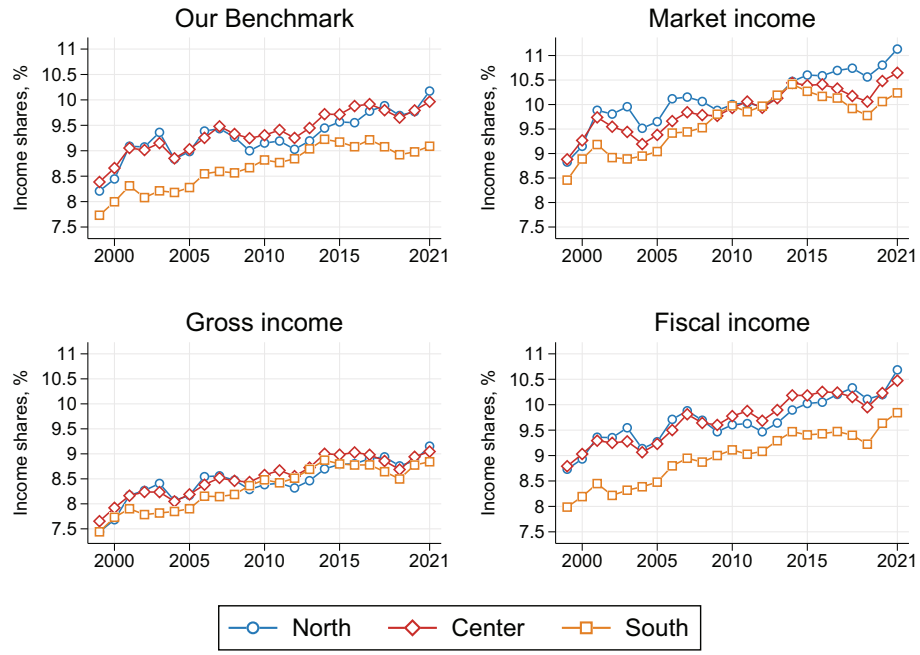


Figure E.5: Share of regional population part of the National top 10%

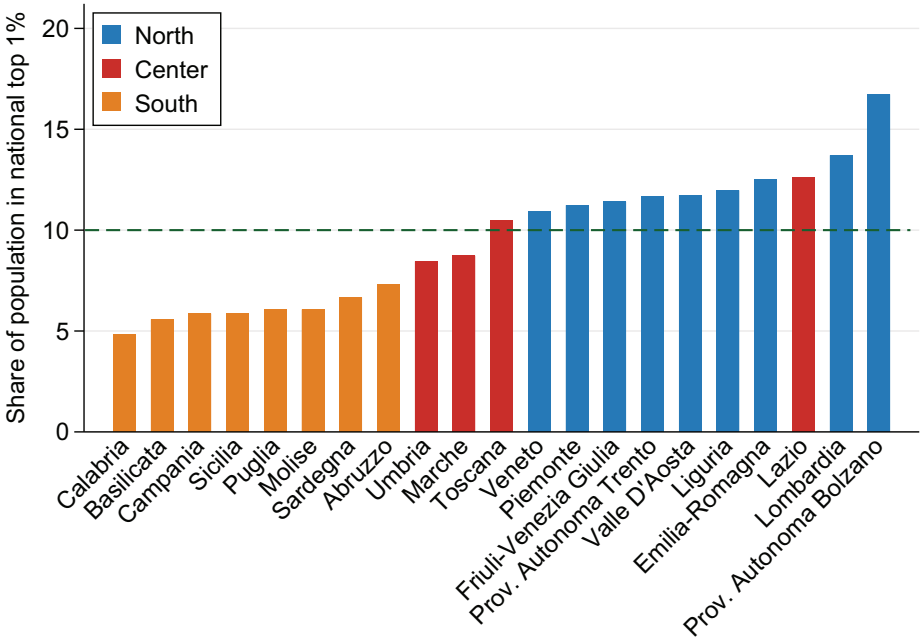


Figure E.6: Share of regional population part of the National top 0.1%

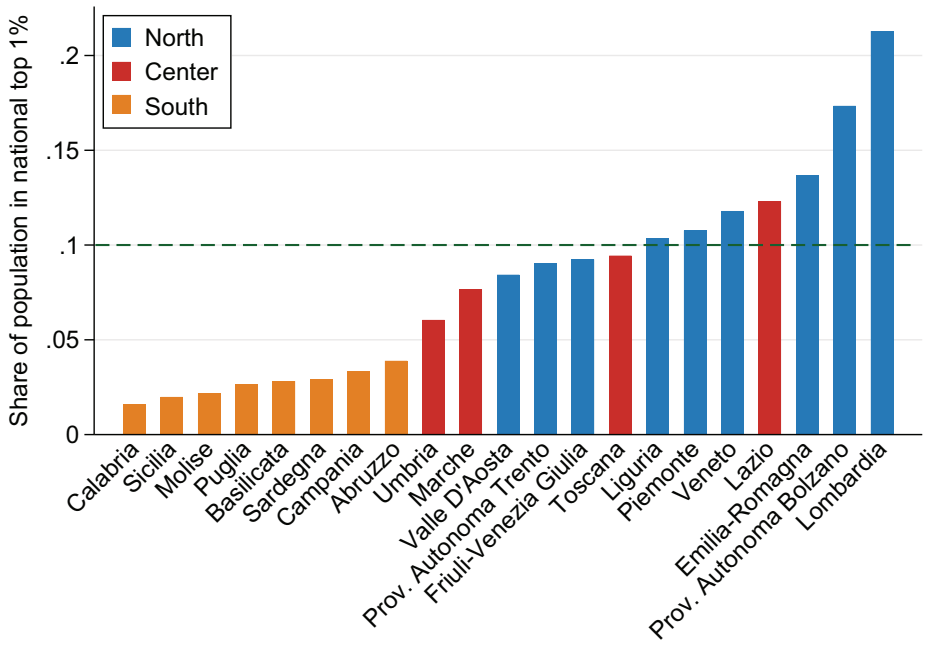
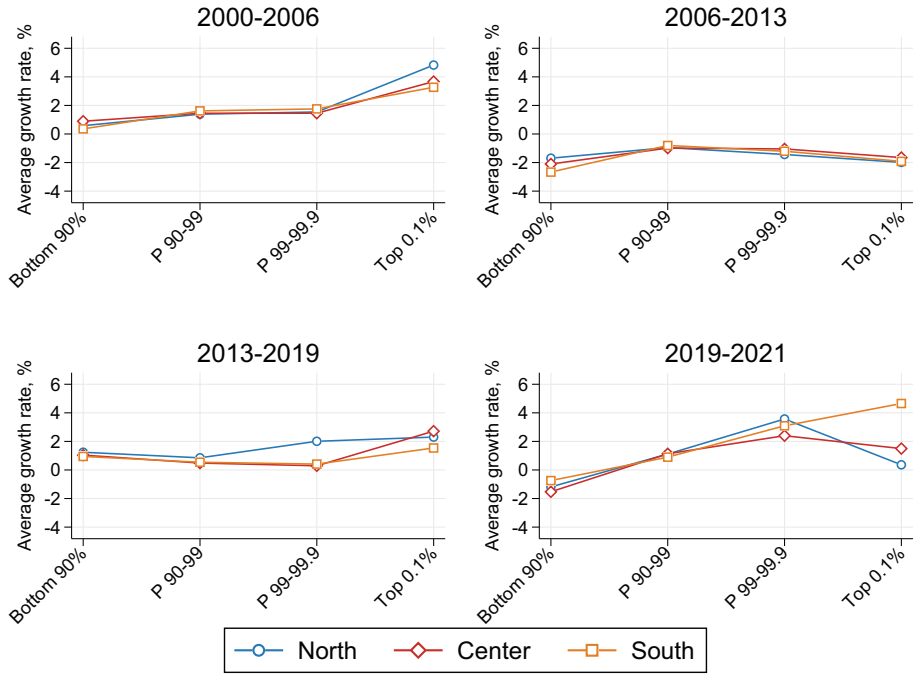
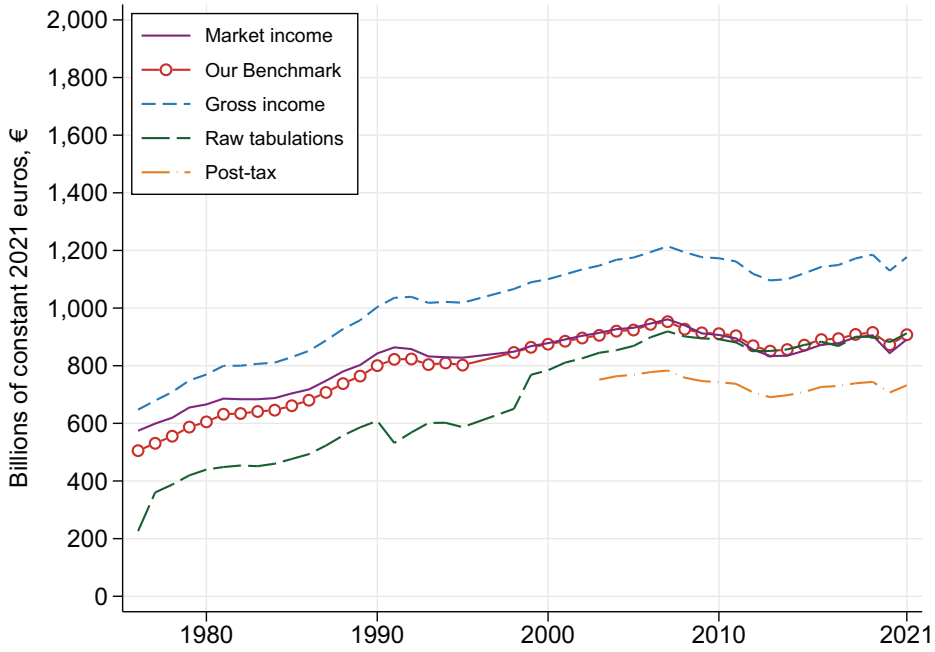


Figure E.7: Average annual real growth by Macro Regional distribution - fiscal income



Note: Real growth is calculated in 2021 prices using NIC indexes released by the National Statistical Office

Figure E.8: Real total income for different income definitions



Note: "Post-tax" is calculated subtracting the personal income taxes paid from "Benchmark income" series