UNIMORE
UNIVERSITÀ DEGLI STUDI DI MODENA E REGGIO EMILIA

CAPP - Centro di Analisi delle Politiche Pubbliche

# CAPP*aper*

**n. 187 | novembre 2023**

# High Inflation and Wage Rigidity:
# The Implicit Response of the Italian Tax-Benefit System

***Stefano Boscolo, Francesco Figari***

**Dipartimento di Economia Marco Biagi**
www.capp.unimore.it

# High Inflation and Wage Rigidity:
## The Implicit Response of the Italian Tax-Benefit System*

Stefano Boscolo[†] and Francesco Figari[‡]

[†] University of Milan – Department of Economics, Management and Quantitative Methods
[‡] University of Eastern Piedmont – Department of Economics and Business Studies

**Abstract**

We study income redistribution in Italy in a context in which benefits are indexed to high inflation, wages struggle to keep pace, and most tax parameters are not indexed. We isolate the contribution of indexation-induced changes in taxes and benefits to the government budget and inequality reduction. Our findings reveal three key effects: *i*) generating resources equivalent to 0.75% of GDP in 2023; *ii*) distributing these resources disproportionately, favoring retirees who experience a 2.2 percentage-point larger increase in disposable income than private sector employees; and *iii*) reducing overall inequality while reinforcing the redistributive capacity of the government.

**JEL**: D31; H23; H24.
**Keywords**: inflation; indexation; fiscal drag; redistribution; EUROMOD.

**Acknowledgements:** The results presented here are based on EUROMOD version I5.41+. Having been originally developed by the Institute for Social and Economic Research, EUROMOD is maintained, developed and managed since 2021 by the Joint Research Centre of the European Commission in collaboration with Eurostat and national teams from the European Union countries. We are indebted to the many people who have contributed to the development of EUROMOD. We make use of microdata from the European Union Statistics on Income and Living Conditions survey, made available by Eurostat. The results and their interpretations are the authors' responsibility. We thank Zareh Asatryan, Domenico Depalo, Carlo Fiorio, Andrea Riganti, Ivica Urban, and the participants at the 2023 Bank of Italy workshop on microsimulation modeling and at the 2024 National Tax Association Conference for their insightful comments and advice on the paper. Stefano Boscolo acknowledges financial support from the "Fund for the Financing of University Departments of Excellence" at the Department of Economics, Management, and Quantitative Methods, University of Milan.

**Corresponding author:** Stefano Boscolo, stefanoboscolo33@gmail.com

* This paper is an updated version of the manuscript published in the CAPP Working Paper Series in November 2023.

# 1 Introduction

This paper examines the redistributive capacity of taxes and benefits in Italy in 2023, a year characterized by high inflation. In the past, periods of high inflation have prompted governments to introduce indexation mechanisms for benefits, and, today, almost all OECD countries provide some form of indexation to address the loss of purchasing power among beneficiaries. In contrast, adjustments to tax systems have been less frequent, and many countries lack automatic mechanisms to account for inflation, even partially (OECD, 2023). We analyze the implicit response of the complex structure of taxes and benefits, which results in a distribution of indexation-induced resources that has yet to receive attention. From a between-category perspective, the combined effect of high inflation, indexation of benefits, nominal upward wage rigidity, and unindexed tax rules, may have several important consequences for tax revenue and income redistribution. Moreover, this involves short- and long-term distributive effects across and within households, in the context of aging societies and inflationary pressures stemming from the transition to green economies.

Italy represents an interesting case in the international context regarding inflation-related matters, due to the different indexation rules of taxes and benefits and their importance in relation to GDP. First, no indexation is in place for tax rules, except for thresholds for social insurance contribution (SICs) payments. In contrast, most benefits are fully indexed to inflation, with three exceptions: *i*) social insurance pensions, for which the adjustment is total up to four times the minimum pension amount and then decreases gradually; *ii*) unemployment benefits and wage compensation schemes, whose adjustment to inflation applies only to high-benefit recipients; and *iii*) the minimum income benefit (*Reddito di Cittadinanza* [RdC][1]), which provides no adjustment.

Second, according to OECD statistics, the joint effective tax rate of personal income tax (PIT) and SICs is among the highest observed in developed economies averaging 53.8% for high-income earners in 2022. This underscores the economic importance of studying "bracket creep", the process by which inflation pushes taxable income into higher tax brackets, leading to "fiscal drag", defined as the increase in effective tax rates that occurs when income rises due to inflation, but tax brackets and expenditure thresholds are not adjusted for inflation. At the same time, according to Eurostat statistics, Italy is among the countries with the highest level of expenditure on social protection relative to GDP, with a ratio of 21.9% in 2022. More than three-quarters of this expenditure is allocated to pensions. These high values and the differentiated adjustments to inflation for different income sources may result in significant shifts in the distribution of resources for the population as a whole.

Moreover, recent evidence suggests that Italy has suffered the highest welfare costs attributable to the recent increase in inflation (Pallotti et al., 2024). These costs are transmitted through various channels. Specifically, we focus on the indirect channel, which includes the effect of the inflation surge on nominal disposable income through taxes and benefits. We extend this analysis by examining the impact of indexation-induced changes in taxes and benefits across different population groups and, more generally, the redistributive capacity of tax-benefit instruments, presenting a methodological framework

[1] The RdC has been substituted by the *Supporto per la formazione e lavoro* for non-working households with all family members between the ages of 18 and 59 and capable of working, starting from September 2023, and by the *Assegno di inclusione* for households with at least one disabled member, underage member or individuals with at least 60 years of age, starting from 2024.

adaptable to any country.

Using the EUROMOD model, we simulate a baseline scenario that closely reflects the 2023 tax-benefit system and the underlying macroeconomic context. In this scenario, pension indexation and nominal wage growth set the stage for fiscal drag. Meanwhile, benefit indexation (including pensions) helps compensate for the loss of purchasing power among specific population groups and influences income inequality. Other non-retirement market income components and wealth assets also grow, but in most cases, at a slower rate than prices. We compare the baseline scenario to a counterfactual scenario in which prices remain unchanged during the 2022–2023 period, and market income and wealth growth are stagnant. As a result, tax-benefit rules that are updated annually to account for inflation remain unchanged, as they were in 2022, while all other factors are kept constant as of 2023. The comparison between scenarios is intended to identify changes in tax revenue and expenditure exclusively related to fiscal drag and benefit indexation. To isolate the contribution of each tax-benefit instrument to income redistribution, we apply the decomposition approach proposed by Urban (2014).

The main result on the budget side is that the net sum of resources channeled to individuals by indexation-induced changes in taxes and benefits amounts to 0.75% of GDP in 2023 (€15.7 billion), equivalent to 80% of the net resources allocated by the 2024 Budget Law. In the context of surging prices and upward wage rigidity, with benefits generally indexed to inflation while most tax brackets and thresholds are left unindexed, the Italian tax-benefit system leads to a distribution of resources in favor of retirees. As a result, the increase in nominal disposable income for retirees and private sector employees differs by 2.2 percentage points in a single year due to inflation. Benefit indexation accounts for 4.3% of the overall government capacity to reduce inequality. In the short term, no benefit erosion – the partial or total withdrawal of benefits following an adjustment to inflation of means-tested incomes – is expected. PIT fiscal drag is found to have a slight regressive effect (-0.3%), which is offset by the equalizing contribution of changes in SICs (0.5%).

The remainder of the paper is structured as follows: Section 2 reviews related studies, Section 3 describes the policy scenarios and the empirical strategy adopted, Section 4 presents the results of the analysis, and Section 5 offers concluding remarks.

# 2 Literature review

Our work aims to contribute to the literature on the redistributive capacity of tax-benefit systems during periods of high inflation. We build on and extend previous contributions that have examined: *i*) the welfare effects of inflation and related government policies, *ii*) bracket creep and fiscal drag, and *iii*) the overall inequality-reducing effect of tax-benefit indexation.

Concerning the first strand of this growing literature, Pallotti et al. (2024) provide a key contribution, showing that the welfare effects of the inflation surge experienced during the 2022–2023 period are negatively correlated with age, as retirees generally hold large nominal assets. At the same time, they emphasize the importance of recognizing the so-called "indirect component" of inflation transmission channels to household welfare. This component reflects the change in disposable income due to the inflationary shock, which is influenced by the tax-benefit system. A few studies have also examined the distributional consequences of income and price government measures introduced to mitigate the effects of rising prices. Amores et al. (2024) show the extent to which the distributional impact

of the inflation surge varied across countries and individuals. The purchasing power of households in Italy decreased by approximately 2.5 percentage points, accounting for all government measures. Curci et al. (2022) observed that the loss before government measures suffered by the poorest households was four times greater than that of the richest households, but it was almost fully equalized after government intervention.

Quite surprisingly, only a handful of studies have examined the performance of inflation-adjustment schemes in detail. Immervoll (2005) shows that the inflation-induced erosion of nominally defined amounts built into relevant tax rules – known as bracket creep – alters the distributional and revenue-generating properties of income taxes and SICs. Fiscal drag is found to increase income redistribution due to the inequality-reducing effect of higher tax burdens that outweigh the reduction in progressivity, as also confirmed by Levy et al. (2010).

On a broader level, Sutherland et al. (2008) explored the long-term impact of uprating rules on poverty rates and income inequality. They point out that fiscal drag plays a smaller role than benefit erosion for households at the bottom of the income distribution, and vice versa. Moreover, Paulus et al. (2020) assess the effect of changes in tax-benefit policy by separating indexation from structural changes in a cross-country perspective. The indexation effect measures the extent to which changes in benefit amounts and tax thresholds contribute to the overall impact of policy changes. They find that indexation not only has a positive effect on household disposable income but also contributes more to reducing poverty and inequality than structural reforms. However, in their study, Italy is an exception to this pattern, where indexation has been observed to slightly decrease disposable income and to have a neutral effect on poverty and inequality.

To the best of our knowledge, our study is the first to quantify the indirect component of inflation transmission channels at micro level as identified by Pallotti et al. (2024). In doing so, it focuses on the distributive consequences of the tax-benefit system among employees, self-employed and retirees, shedding light on what explains income redistribution in a context of high inflation and upward wage rigidity – an aspect previously ignored in the literature.

# 3 Institutional context and empirical strategy

In the Italian tax-benefit system, in each year ($t$), thresholds for SIC payments, pensions, and most social transfers are indexed based on the percentage change between the Consumer Price Index for Families of Workers and Employees (FOI index, according to the Italian acronym) in the previous year ($t-1$) and the corresponding value in $t-2$. The indexation factor ($r$) applied in 2023 was 8.1%, reflecting inflation in 2022. As a reference, inflation in 2023 was 5.4%. It follows that in a year in which prices are subject to steep increases, the purchasing power of benefits falls as the indexation mechanism delays the adjustment until the following year. This loss is not further aggravated by benefit erosion, as means-tested incomes refer in most cases to years before the inflation surge. On the other hand, PIT brackets and tax reliefs are not indexed, leading to fiscal drag. For full details on the tax-benefit rules that are updated yearly to account for inflation, we refer the reader to Appendix A, while Table 1 provides a brief summary.

**Table 1** Summary of inflation-dependent tax-benefit rules for 2023

| Instruments | Indexation | Description |
|---|---|---|
| *Taxes*: | | |
| Social insurance contributions | Full | Indexation applies to minimum and maximum earnings thresholds |
| Personal income tax | Absent | Neither tax brackets, tax credits, nor expenditure thresholds are indexed |
| *Benefits*: | | |
| Social insurance pensions | Partial | Indexation is fully applied up to four times the minimum pension amount, then decreases gradually; in the highest class (over ten times the minimum pension amount), indexation is set at 32% of the indexation rate |
| Work-replacement benefits | Partial | Indexation applies to maximum benefit amounts, but since benefits are based on percentages of past earnings (up to four years before benefit receipt), only high-earning recipients experience a benefit increase |
| Social assistance pensions | Full | Indexation applies to benefit amounts and means-testing thresholds; means testing refers to one year before benefit receipt |
| Family allowances | Full | Indexation applies to benefit amounts and means-testing thresholds; means testing refers to two years before benefit receipt |
| Minimum income scheme | Absent | Neither benefit amounts nor means-testing thresholds are indexed; means testing refers to two years before benefit receipt |

## 3.1 Data and policy scenarios

The simulations of the Italian tax-benefit system presented in this paper rely on EUROMOD, the tax-benefit model for the European Union countries (Sutherland and Figari, 2013). The model enables the calculation of taxes paid and benefits granted at the national and subnational levels in great detail. Pensions and contributory social transfers are included in the model as reported in the input data and are not simulated due to the lack of information on the working history of each individual. The input data are derived from the 2019 Italian cross-sectional component of the European Union Statistics on Income and Living Conditions survey (EU-SILC), which contains detailed information on income and sociodemographic characteristics at both the individual and household levels. The dataset comprises data on 43,317 individuals living in 20,831 households, with monetary amounts referring to the year preceding the interview (2018). Time inconsistencies between monetary input data that feed the model and the tax year are corrected using uprating factors, a standard practice in static microsimulation modeling (Li et al., 2014). This does not apply to social insurance pensions, whose indexation is modeled internally by replicating indexation rules. Individual behaviors, such as labor supply or tax avoidance, are assumed to be fixed in response to fiscal shocks.

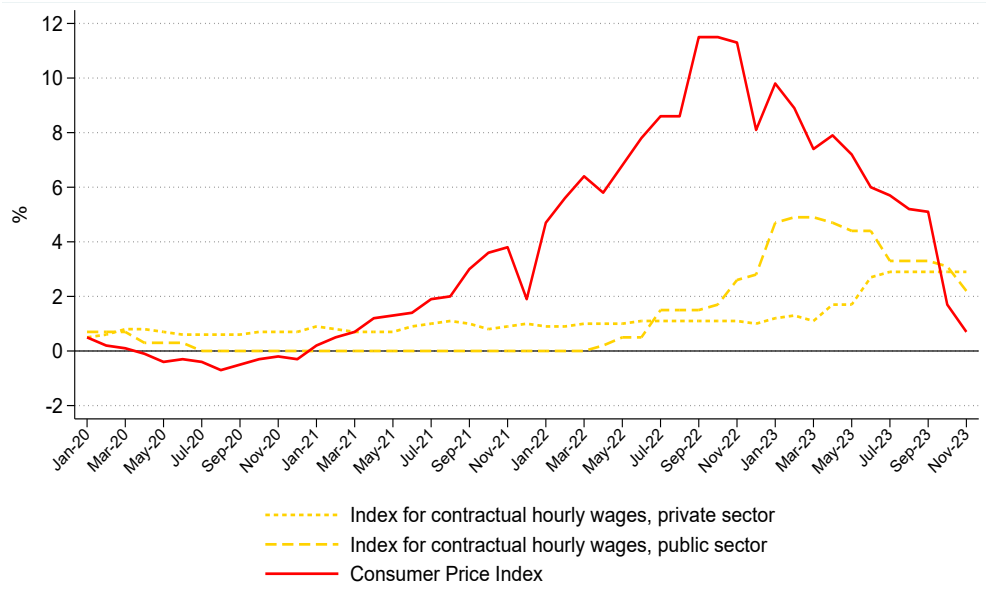
To study the effect of indexation-induced changes in taxes and transfers to the government budget and income redistribution, we start with a baseline scenario that closely reflects the 2023 tax-benefit system[2] and the underlying macroeconomic context. In 2023, inflation is relatively high, following the even steeper increase in 2022, while wages, non-retirement income components and wealth assets struggle to keep up with prices, though to varying degrees depending on occupational status, income source and asset. We assume that wage growth is driven by partial and delayed adjustments to prices rather than labor productivity growth.[3] Figure 1 provides evidence of nominal upward wage rigidity in the Italian context as shown by the Index for contractual hourly wages released by

[2] The simulations are based on EUROMOD version I5.41+, which defines tax-benefit rules as of June 2023. However, we have incorporated the changes in rules that took place in the second half of the year.

[3] Italy shows no sign of labor productivity growth, according to Eurostat statistics on nominal labor productivity growth per person employed. The annual variation is negative in the 2017–2022 period, except for 2021.

the Italian National Institute of Statistics (ISTAT) separately for the private and public sectors. We assume that self-employment income growth in 2023 follows 85% of the price growth, based on the ratio between the average increase in self-employment income according to official statistics on tax returns data (6.9%) and the inflation rate in 2022 (8.1%). Financial wealth and capital income are updated based on the average interest rate of state bonds, while housing wealth is relevant to our purposes only in the form of cadastral values, which are assumed to remain constant in the short term. Rental income is aligned with price growth according to contract type and tax regime.[4] We also account for the misalignment between the year of benefit receipt ($t = 2023$) and the reference year for means-testing purposes of simulated benefits (i.e., $t-2$ for the minimum income benefit and family allowances, and $t-1$ for the social pension) by assuming that income and wealth components remain constant until 2023, except for the correction of time inconsistencies in the input data through uprating.[5]

**Figure 1** Wage and price growth




Note: Monthly change with respect to the previous-year value. The value of the salary index for the public sector in December 2023 is not reported as it reflects an extraordinary increase (compared to December 2022) equal to 22.2%. The increase is structured as an advance payment, which will be deducted from future salary increases negotiated in upcoming contract renewals. The advance is fully subject to PIT. Source: ISTAT statistics.

The income distribution derived from the baseline is compared with the distribution obtained by running a steady-state counterfactual scenario in which no price growth occurs in the 2022–2023 period. This implies no growth in income and wealth and that simulated

[4] For long-term residential dwelling contracts, rent is fully indexed for free market agreements (*Contratti di locazione a canone libero)* and capped at 75% for agreements with a pre-determined rate (*Contratti di locazione a canone concordato*). However, no indexation applies if property owners opt for the substitute tax scheme for rents (*cedolare secca*) instead of the PIT. This scheme offers a significant reduction in tax liabilities for high-income PIT taxpayers.

[5] The amounts of these benefits are derived by running the model two additional times – one execution for each year before 2023 – and uprating input data to the relevant reference year for the means testing of simulated benefits, while setting tax-benefit rules as of 2023 except for specific adjustments aimed at ensuring a reliable reconstruction of means-tested income components. The same procedure is applied to the simulation of these benefits in all policy scenarios derived in this paper.

tax-benefit rules anchored to inflation are scaled back to 2022 levels compared to the baseline. Pension benefits vary due to indexation only.[6] The counterfactual scenario does not account for the recent reductions in social insurance contribution rates for employees as inflation-dependent policy changes, but rather as labor supply incentives for low-to-middle-earning workers. This interpretation aligns with the 2024 Budget Law, which confirmed these reductions despite the decline in inflation to pre-pandemic levels.[7]

In Table 2, we summarize the differences in tax-benefit rules between baseline and counterfactual. We refer the reader to Appendix B for full details on the rates used in the uprating procedure and their sources, the variables to which uprating applies, and the distinction between simulated pensions and social transfers and those derived from input data, while Table 3 provides a summary of uprating rates.

[6] Retirement benefit formulas for most retirees are partly based on average inflation-indexed wages and partly on accrued social insurance contributions indexed to nominal GDP growth. In our counterfactual, this has a negligible impact on benefit calculations for new retirees starting from 2022. According to Italian rules, wage indexation applies up to two years before retirement, effectively eliminating the influence of varying inflation rates in our study. Moreover, contributions paid in the year before and the year of retirement are not indexed. The impact is therefore limited to contributions accrued from two years prior to retirement, which were expected to accrue based on real GDP growth in the period 2022–2023.

[7] The first reduction in contribution rates was introduced in 2022, amounting to 0.8 percentage points (pp) for the first half of the year and 2 pp for the second half, targeting employees with gross labor income for contribution purposes up to €35,000 per year. A further reduction of 1 pp was mandated for the first half of 2023, applying to incomes up to €25,000. Finally, the most significant drop was introduced for the second half of 2023, equal to 4 pp for incomes up to €35,000, resulting in a cumulative reduction of 6 pp for incomes up to €25,000 and 7 pp for incomes between €25,000 and €35,000 (with a contribution rate of 9.19% before reductions).

**Table 2** Differences in tax-benefit rules for 2023 between scenarios

| Rules | Baseline | Counterfactual |
|---|---|---|
| *Social insurance pensions*: | | |
| Indexation rate (%): | | |
| $wp_{2022} \leq 4 * mp_{2022}$ | 8.1 | 0 |
| $4 * mp_{2022} < wp_{2022} \leq 5 * mp_{2022}$ | 6.9 | 0 |
| $5 * mp_{2022} < wp_{2022} \leq 6 * mp_{2022}$ | 4.3 | 0 |
| $6 * mp_{2022} < wp_{2022} \leq 8 * mp_{2022}$ | 3.8 | 0 |
| $8 * mp_{2022} < wp_{2022} \leq 10 * mp_{2022}$ | 3.0 | 0 |
| $wp_{2022} > 10 * mp_{2022}$ | 2.6 | 0 |
| *SICs paid by employees*: | | |
| Income thresholds: | | |
| Minimum | 11,813 | 10,928 |
| Maximum | 113,520 | 105,014 |
| Contribution rates (%): | | |
| $gw_{2023} \leq 25,000$ | 4.19 | 4.19 |
| $25,000 < gw_{2023} \leq 35,000$ | 5.19 | 5.19 |
| $35,000 < gw_{2023} \leq 48,279$ | 9.19 | 9.19 |
| $48,279 < gw_{2023} \leq 52,190$ | 9.19 | 10.19 |
| $gw_{2023} > 52,190$ | 10.19 | 10.19 |
| *SICs paid by self-employed*: | | |
| Income thresholds: | | |
| Minimum | 17,504 | 16,243 |
| Middle | 52,190 | 48,279 |
| Maximum | 86,983 | 80,465 |
| *Social pension*: | | |
| Income threshold | 6,543 | 6,097 |
| *Family allowances*: | | |
| ISEE thresholds: | | |
| Minimum | 16,215 | 15,000 |
| Maximum | 43,240 | 40,000 |

Note: $wp_{2022}$: sum of old-age/seniority pensions, survivors' pensions and incapacity pensions; $mp_{2022}$: minimum pension amount; $gw_{2023}$: monthly wage before employee-side contributions and PIT withholdings. SIC thresholds are reported for full-year working individuals. Among workers in the baseline, roughly 99.1% have a labor income lower than the maximum SIC threshold; their average labor income amounts to €23,420. ISEE is a composite indicator of income and assets. The table is not exhaustive and does not include all changes to inflation-dependent rules. All other changes not reported here follow the same logic as the changes detailed above. For example, the maximum monthly base amount per underage child for family allowances is reduced from €189.19 per month to €175 in the counterfactual.

**Table 3** Summary of changes in uprating factors for 2023

| Index | Baseline (a) | Counterfactual (b) | Δ% |
|---|---|---|---|
| Employment income index, private sector | 105.9 | 102.4 | -3.3 |
| Employment income index, public sector | 108.8 | 102.1 | -6.2 |
| Self-employment income index | 114.8 | 102.7 | -10.5 |
| Interest rate index | 107.2 | 101.6 | -5.2 |
| Consumer Price Index | 116.4 | 102.1 | -12.3 |
| Index for tax-benefit indexation | 110.4 | 102.1 | -7.5 |

Note: Base index values are set to 100 in 2018. $\Delta$ is the change in index values between scenarios, that is, $\Delta = (b-a)/a$. For instance, employment income for private sector employees reduces by 3.3% in the counterfactual with respect to the baseline.

## 3.2 Isolation of tax revenue and expenditure changes

In a context of increased nominal incomes, the change in tax revenue between the baseline and the counterfactual scenario comprises two components. The first is the indexation-induced change due to the difference in effective tax rates at the individual level ($\Delta F$). More generally, this component provides a quantification of fiscal drag and would not appear if all monetary parameters of the tax system were fully indexed according to income growth. It is broken down into the contribution of SICs – separately for SICs

paid by self-employed ($\Delta F_{SIC_{SE}}$) and by employees/atypical workers ($\Delta F_{SIC_E}$) – and the contribution of PIT ($\Delta F_{PIT}$).[8] No differences arise from income components subject to proportional taxes. More formally:

$$\Delta F = \Delta F_{SIC_{SE}} + \Delta F_{SIC_E} + \Delta F_{PIT} = \sum y_i * \left(er_i - er_i^C\right) \tag{1}$$

where $\Delta F$ is the increase in tax revenue due to the effect of fiscal drag; $y_i$ is the gross income for contribution purposes in the baseline for the $i$-th taxpayer; $er_i$ and $er_i^C$ are the effective tax rates – computed by combining SICs and PIT together – in the baseline and counterfactual, respectively. To account for the sequentiality in the calculation of SICs and PIT for labor income recipients, a factor adjustment is applied to $\Delta F_{PIT}$. See Appendix C for a simplified illustration of this factor and for details on the breakdown of the indexation-induced change in tax revenue. Finally, note that reverse fiscal drag may also occur when tax brackets increase faster than taxable income, pushing taxpayers into lower brackets; or in a framework with fixed contribution rates and minimum income thresholds for SIC payments such as the Italian one, if taxable income moves from above to below these thresholds due to differentiated adjustments to inflation of wages and thresholds. In these cases, the change in tax revenue would be negative ($\Delta F < 0$).

The second component that determines the change in tax revenue between the baseline and the counterfactual scenario is the change due to the increase in the tax base ($\Delta T$). As such, it is not due to fiscal drag, but it has an effect on disposable income as it compensates for part of the increase in the observed gross income. Formally, it can be defined as:

$$\Delta T = \sum \Delta y_i * er_i^C \tag{2}$$

where $\Delta y_i$ is the change in gross income due to inflation and $er_i^C$ is the effective tax rate in the counterfactual scenario. The sum of $\Delta T$ and $\Delta F$ is equal to the change in tax revenue between scenarios.

The expenditure change attributed to indexation ($\Delta B$) is derived by summing the differences between the baseline and counterfactual pensions and social transfers at the individual level. For the purposes of our analysis, we divide benefits into six main aggregates: social insurance pensions ($B_{Sip}$), which are only partially indexed to inflation as their amount increases; social assistance pensions ($B_{Sap}$); family allowances ($B_{Fam}$)[9]; work-replacement benefits ($B_U$), which are indexed only for recipients of high benefit

[8] In our simulations, the effective PIT rate includes the regional surtax and the tax relief granted through the in-work benefit for employment income recipients (*Bonus IRPEF*). Self-employment income is entirely subject to PIT for simulation purposes rather than subject to the substitute tax regime. As a result, fiscal drag for self-employed may be slightly overestimated.

[9] Family allowances are the sum of the Universal Children Allowance (AUU) and the allowance for households without children (ANF). The ANF has a peculiar indexation mechanism. Thresholds and benefit amounts are updated on July 1 and not on January 1. This implies significant computational difficulties. We impose no benefit change as the measure interests a very small group of the population. As a result, the determination of $\Delta B_{Fam}$ rests with the AUU. See Appendix A for further details on both measures.

amounts[10]; other social transfers ($B_{Sot}$)[11]; and the minimum income benefit ($B_{Mi}$), which is not subject to indexation.[12] From the above, it follows that:

$$\Delta B = \Delta B_{Sip} + \Delta B_{Sap} + \Delta B_{Fam} + \Delta B_{U} + \Delta B_{Sot} + \Delta B_{Mi} \tag{3}$$

The indexation-induced changes in tax revenue and expenditure can be summarized by the "net indexation gain", which is given by the extra expenditure for benefits due to indexation of their amounts ($\Delta B$) minus the extra tax revenue ($\Delta F$) due to fiscal drag. As such, the net indexation gain represents the amount of resources additionally available to individuals due to the net effect of indexation and fiscal drag.

### 3.3 Income redistribution and the contribution of tax-benefit instruments

The redistributive capacity of a fiscal system is given by the difference in income inequality before and after taxes and benefits, usually referred to as the redistributive effect or, more generally, income redistribution. This measures the extent to which government policies alter the distribution of income within a society compared to what the distribution would be based purely on market outcomes.

Starting from the seminal contribution by Kakwani (1977), income redistribution can be defined as a function of the average tax rate and the progressivity of the tax system, which is determined by the distribution of the tax burden along income levels. A common approach to measuring it derives the redistributive effect as the difference between the vertical effect and the horizontal effect (Kakwani, 1984). In our analysis, the vertical effect refers to the ability of a tax-benefit system to differentiate the net tax burden – i.e. total taxes minus total benefits – in compliance with the principle of vertical equity, which requires that individuals or households with a different ability to pay should bear different liabilities. In simpler terms, high-earning taxpayers should bear higher relative liabilities than low-earning taxpayers, and any measure of vertical fairness is intended to capture the extent of this redistribution from rich to poor. On the other hand, the horizontal effect refers to the principle of horizontal equity, which states that individuals or households with the same ability to pay should bear the same liabilities. This measure of horizontal fairness captures the extent to which unequal treatment of equals contributes to increasing inequality. It follows that no violation of the horizontal equity principle yields a zero horizontal effect such that the redistributive effect equals the vertical effect. In real-world tax-benefit systems, the vertical effect is the dominant component in determining the overall redistributive impact, while the horizontal effect represents a smaller factor related to the unintended consequences or inefficiencies in treating equals unequally.

[10] Benefit amounts are a percentage of monthly wages before unemployment or retention and are subject to inflation-dependent caps. It follows that only those whose previous income is higher than pre-adjusted thresholds see an increase in the benefit (roughly 11.2% of work-replacement benefit recipients in the baseline). See Appendix A for further details.

[11] This category consists of various social transfers including housing benefits, lump sum maternity payments, and scholarships and grants. Their contribution to total benefits is very limited. The social bonuses for energy-related expenses in force in 2023 are not included in this category, since they are neither simulated by the EUROMOD model nor drawn from input data due to lack of information.

[12] The difference between scenarios of the minimum income benefit is expected to equal zero, given the related means-testing procedure (which refers to the income and wealth profiles from two years prior to benefit receipt) and the lack of adjustment to price growth for benefit amounts and thresholds.

### 3.3.1 The contribution of fiscal drag and benefit indexation to a marginal change in income redistribution

From a methodological perspective, our work relates to the strain of literature that looks at the contribution of taxes and benefits to income redistribution (Fuest et al., 2010; Gornick and Smeeding, 2018; Guillaud et al., 2018; related to Italy, see Barbetta et al., 2018; Di Caro, 2020). In this regard, we add a further dimension by isolating the contribution of indexation-induced tax and benefit changes. The decomposition approach proposed by Urban (2014) is used for this purpose.

Urban (2014) uses the methodology of Lerman and Yitzhaki (1985) based on marginal changes in income sources to decompose a marginal change in redistribution *à la* Kakwani (1984). The resulting decomposition is suitable for studying the contribution of taxes and benefits to a marginal change in the redistributive effect and its vertical and horizontal effects. We formalize the decomposition approach in Appendix D, but provide in what follows the main equations to ease the interpretation of the results.

A marginal change in the redistributive effect ($\widehat{RE}$) of a tax-benefit system can be decomposed into the sum of single instruments' contributions:

$$\begin{gathered}\widehat{RE} = \widehat{VE} - \widehat{HE} \\ \sum \widehat{RE}_{T_j} + \sum \widehat{RE}_{B_j} = \left(\sum \widehat{VE}_{T_j} + \sum \widehat{VE}_{B_j}\right) - \left(\sum \widehat{HE}_{T_j} + \sum \widehat{HE}_{B_j}\right)\end{gathered} \tag{4}$$

where $\widehat{VE}$ and $\widehat{HE}$ are the marginal changes in the vertical and horizontal effects associated with the *j-th* tax-benefit instruments.

Upon manipulation, the components of Eq. (4) can be rewritten as the following by-products[13] (indicated by $\sim$) and further decomposed into the sum of single instruments' contributions:

$$\widetilde{RE} \;\rightarrow\; C_{Y_g,Y_d} - G_{Y_d} \tag{5}$$

$$\widetilde{VE} \;\rightarrow\; G_{Y_g} - C_{Y_d,Y_g} \tag{6}$$

$$\widetilde{HE} \;\rightarrow\; \left(G_{Y_g} - C_{Y_d,Y_g}\right) - \left(C_{Y_g,Y_d} - G_{Y_d}\right) \tag{7}$$

where $G_{Y_g}$ and $G_{Y_d}$ are the Gini coefficients of pre- and post-fiscal income, respectively; while $C_{Y_g,Y_d}$ is the concentration coefficient of pre-fiscal income ordered by non-decreasing values of post-fiscal income, and vice versa for $C_{Y_d,Y_g}$. For clarity and comparison of the results with previous contributions in the literature, note that $\widetilde{VE}$ corresponds to the vertical effect derived in Kakwani (1984), while $\widetilde{HE}$ corresponds to the sum of the horizontal effects derived in Kakwani (1984) and Lerman and Yitzhaki (1995). For brevity, we will omit "marginal change" when referring to tax-benefit contributions in the presentation of the results.

[13] A by-product can be defined as a secondary outcome of algebraic operations. In our case, they are the product of the marginal changes in Eq. (4), as defined within the framework of Kakwani (1984)'s decomposition of the redistributive effect, by a scaling factor equal to the ratio between mean post-fiscal income and mean pre-fiscal income, the latter proportionally incremented by the marginal change. See Appendix D for details.

To our knowledge, it is the only complete and unique approach based on solid normative grounds. The approach is "complete", as it provides a decomposition for both vertical and horizontal effects, while "unique" refers to the ability to yield single results with no discretion left depending on the sequence in which taxes and benefits are evaluated moving from gross to disposable income. Furthermore, the use of marginal methods may sound rather appealing to policymakers seeking to support household purchasing power in times of soaring prices through marginal changes to indexation rules.

We perform the decomposition for the baseline and the comparison with the counterfactual scenario allow us to capture the differences in taxes and benefits due to fiscal drag and indexation. We consider indexation-induced changes and net taxes and benefits – i.e. net from indexation-induced changes – as separate instruments. Following the literature (Bargain, 2014), we include social insurance pensions and work-replacement benefits (i.e. unemployment benefits and wage compensation schemes) among market income components. However, we isolate the effect of their indexation-induced changes, as these are implemented annually as policies intended to maintain the purchasing power of recipients.

# 4 Results

All results are obtained by taking as the unit of analysis the individual with income equivalized through the modified OECD equivalence scale, except where explicitly stated otherwise. We first focus on the contribution of indexation-induced changes in tax revenue and benefit expenditure to the resources available to individuals, referred to as the net indexation gain. A detailed analysis of the distribution of indexation-induced changes by income groups and individual prevalent income source follows. Finally, we analyze the redistributive effect, highlighting whether indexation-induced changes reduce or increase inequality.

## 4.1 Contribution of taxes and benefits to the net indexation gain

Table 4 presents non-equivalized changes in tax revenue and benefit expenditure in 2023 as described in Eqs. (1)-(3). The net indexation gain is given by the extra expenditure for benefits ($\Delta B$) minus the extra tax revenue due to lack of indexation ($\Delta F$ or fiscal drag) and amounts to 0.75% of GDP (€15.7 billion), a non-negligible amount of public resources accrued to individuals. To understand the economic importance of this estimate, the gain related to indexation is roughly equivalent to 80% of the net resources allocated by the 2024 Budget Law (Italian Parliamentary Budget Office, 2024). The additional increase in tax revenue that is not attributable to fiscal drag ($\Delta T$) amounts to 0.77% of GDP (€16.2 billion). Overall, the additional tax revenue – due to an increase in taxable income – allows full funding of the net indexation gain.

On the one hand, the greatest contribution to the net indexation gain comes from social insurance pensions for a value of 0.88% of GDP, in favor of 10.9 million households. Other benefits indexed to inflation – including work-replacement benefits, social assistance pensions, family allowances, and other transfers – contribute positively to the net indexation gain for a total of 0.23% of GDP. On the other hand, the erosion attributed to fiscal drag through PIT unveils a resource drain equal to 0.35% of GDP, distributed among 21.9 million households. Indexation-induced changes in SICs amount to 0.05% for employees and -0.04% for self-employed, the latter indicating reverse fiscal drag.

**Table 4** Contribution of taxes and benefits to the net indexation gain

| Indexation-induced changes | €(bn) | % GDP | Frequency (No. hh) |
|---|---|---|---|
| Change in taxes ($\Delta F$ or fiscal drag) | 7.484<br>(7.356, 7.639) | 0.36<br>– | –<br>– |
| Employee SICs | 0.956<br>(0.869, 1.054) | 0.05<br>– | 5.911<br>(5.743, 6.103) |
| Self-employed SICs | -0.823<br>(-0.864, -0.789) | -0.04<br>– | 4.853<br>(4.680, 5.032) |
| Personal income tax | 7.351<br>(7.244, 7.491) | 0.35<br>– | 21.867<br>(21.701, 22.054) |
| Change in benefits ($\Delta B$) | 23.181<br>(22.924, 23.439) | 1.11<br>– | –<br>– |
| Social insurance pensions | 18.418<br>(18.180, 18.677) | 0.88<br>– | 10.937<br>(10.806, 11.063) |
| Work-replacement benefits | 0.197<br>(0.158, 0.239) | 0.01<br>– | 0.399<br>(0.347, 0.454) |
| Social assistance pensions | 2.231<br>(2.125, 2.330) | 0.11<br>– | 3.530<br>(3.385, 3.658) |
| Family allowances | 2.122<br>(2.084, 2.156) | 0.10<br>– | 7.956<br>(7.811, 8.085) |
| Other social transfers | 0.213<br>(0.175, 0.253) | 0.01<br>– | 0.764<br>(0.668, 0.851) |
| Net indexation gain ($\Delta B - \Delta F$) | 15.698<br>(15.401, 15.976) | 0.75<br>– | –<br>– |
| Change in taxes due to increased tax bases ($\Delta T$) | 16.170<br>(15.851, 16.594) | 0.77<br>– | –<br>– |

Note: Values in non-equivalized terms. Households in millions. 95% confidence intervals between brackets. $\Delta F$, $\Delta B$ and $\Delta T$ are derived from the comparison of the income distribution resulting from the baseline and the distribution obtained by running a steady-state counterfactual scenario in which no price growth occurs in the 2022–2023 period. The change in the minimum income scheme is not reported as there is no change between scenarios. Source: Authors' elaborations of EUROMOD outputs.

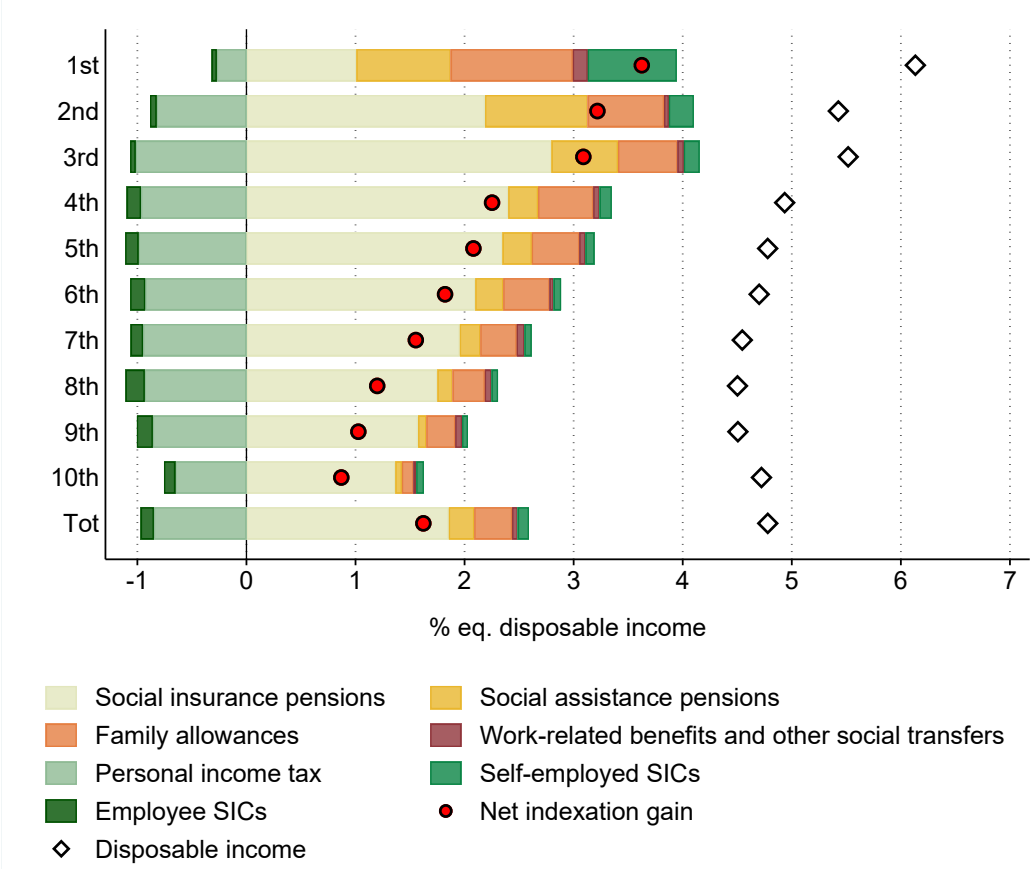
## 4.2 Distribution of indexation-induced changes among individuals

We look at how indexation-induced changes in tax revenue and benefit expenditure are distributed along the distribution of equivalized disposable income and by prevalent income source. This helps provide an initial understanding of the contribution of fiscal drag and benefit indexation to income redistribution. In addition to the net indexation gain, which is equal to the sum of indexation-induced changes, we report the change in nominal disposable income between scenarios. The comparison between the two aggregates offers some insight into the extent to which fiscal drag and benefit indexation – rather than adjustments to inflation of non-retirement market income components net of taxes – explain the observed differences in disposable income.

The inequality-reducing property of indexation-induced changes can be clearly seen in Figure 2. Net indexation gains significantly contribute to differences in disposable income, and they decrease with income decile groups, ranging from more than half in the first decile group to roughly one-fifth of disposable income changes in the tenth decile group. The resources channeled through indexation for family allowances and social assistance pensions account for a large share of inflation gains for the poorest income group only.

More generally, social insurance pensions provide more support to low-to-middle-income levels, which is in line with the higher incidence of recipients in that specific segment of the distribution. A series of factors contribute to the distributional pattern of PIT fiscal drag among income groups. These include the steeper slope of the tax incidence curve for low-to-middle-income taxpayers and the adjustment to inflation for social insurance pensions, which is partial and diminishes for high-benefit recipients.

**Figure 2** Indexation-induced changes and disposable income change by income decile groups




Note: Equivalized disposable income decile groups in the baseline on the horizontal axis. Indexation-induced changes and disposable income changes are derived from the comparison of the income distribution resulting from the baseline and the distribution obtained by running a steady-state counterfactual scenario in which no price growth occurs in the 2022–2023 period. Source: Authors' elaborations of EUROMOD outputs.

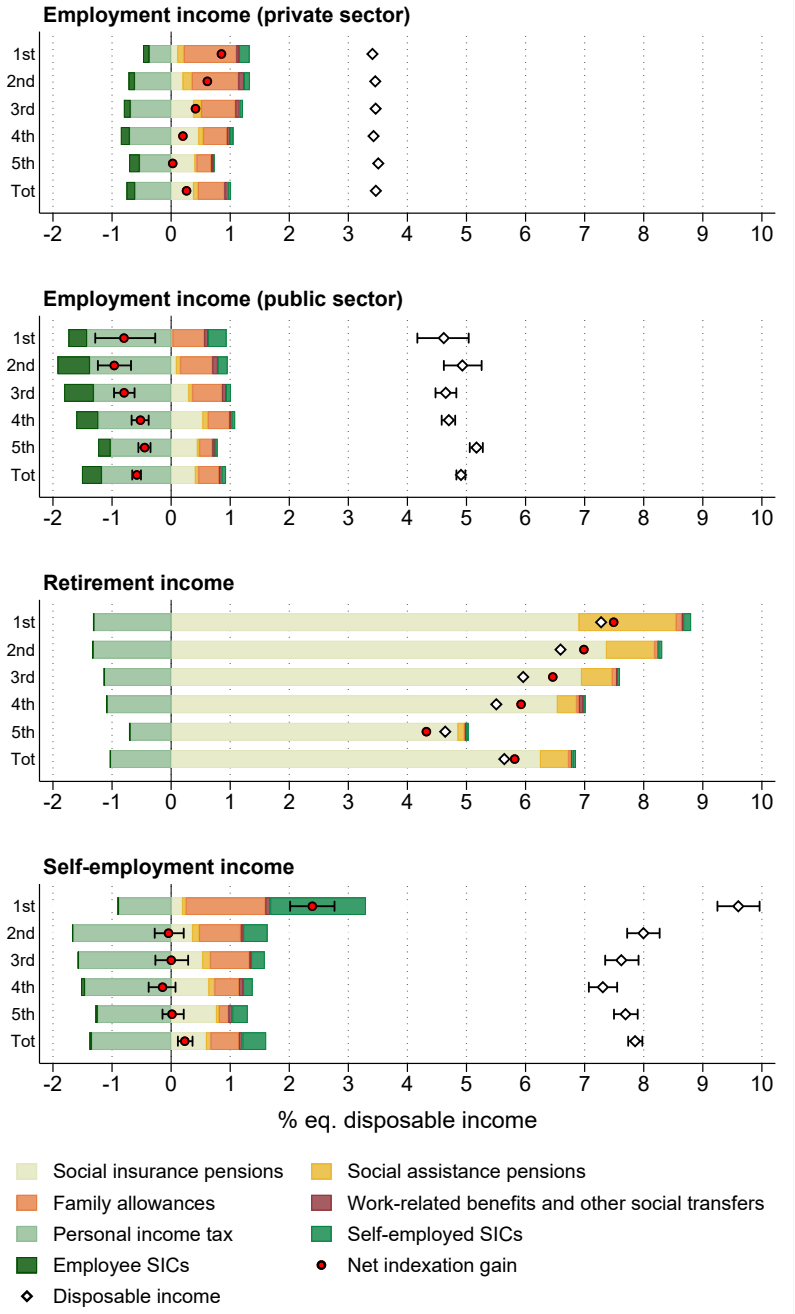
The grouping of individuals by prevalent income source in Figure 3 highlights the greater amount of resources provided to retirees than to other income recipients due to indexation-induced changes. The net indexation gain for retirees accounts for 5.8% of their disposable income and contributes almost entirely to determine the observed differences in disposable income between the baseline and the counterfactual scenario.[14] This translates into a less burdensome loss in relative purchasing power for retirees compared to other individuals (except self-employed). In fact, the increase in disposable income for retirees is greater by 2.2 percentage points with respect to private sector employees. This is also true when compared to public sector employees, but to a lesser extent

[14] The greater net indexation gain over the change in disposable income for retirees may initially appear unusual but signals the very low incidence of receipt of non-retirement market income components among retiree households.

(0.7 percentage points). Self-employed are the most affected by PIT fiscal drag. Income uprating implies an increase in self-employment income that is significantly higher than the rate at which pensions and other benefits adjust to inflation. This yields no inflation gain for most self-employed, except for those in the first quintile, where changes in family allowances and SICs are more pronounced. Low-income self-employed experience a greater reduction in effective contribution rates compared to richer self-employed, as individuals with pre-adjustment income below the minimum threshold for SIC payment have a post-adjustment income that often exceeds the same threshold.[15] Public sector employees face net inflation losses across all income levels and are also more impacted by fiscal drag compared to retirees. The differentiated impact of PIT fiscal drag can also be appreciated by looking at the average increase in non-equivalized PIT burdens in Figure 4. The average changes in effective PIT rates are reported by income classes as defined in official statistics on tax return data. The larger increases fall within the first and second PIT brackets (up to €28,000), where fiscal drag arises mostly. The greater variability displayed for specific employee categories is generally explained by the smaller subgroup size and by the interaction between inflation adjustments and the receipt of the in-work benefit.

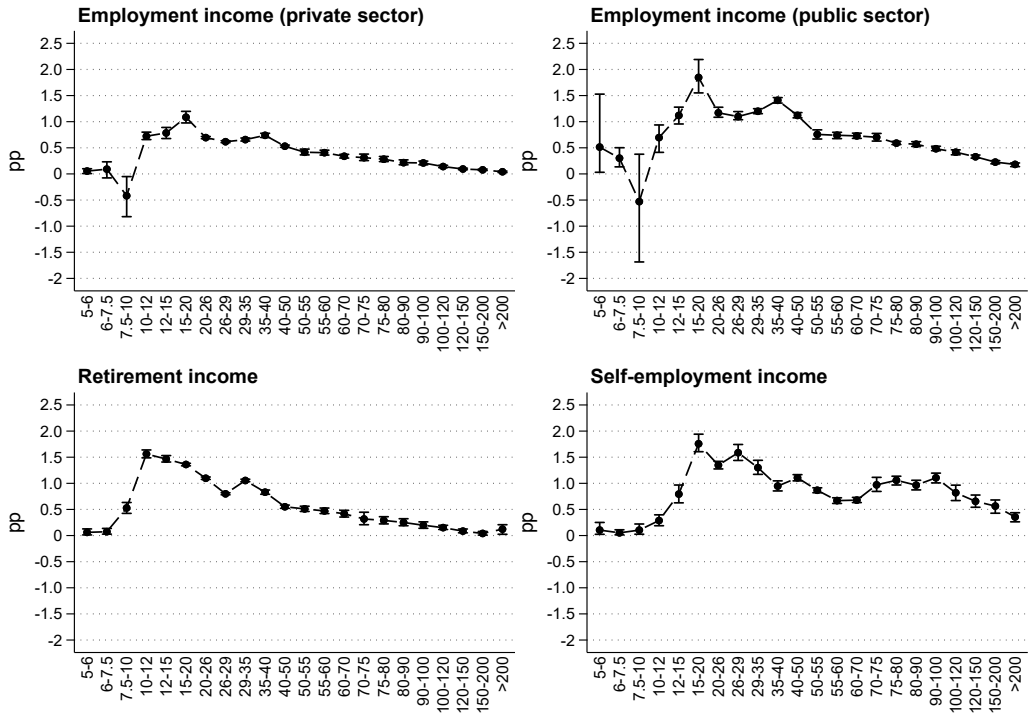
[15] See Appendix A for a simplified example of the interaction between labor income growth and inflation-dependent thresholds for the payment of SICs.

**Figure 3** Indexation-induced changes and disposable income change by prevalent income source and income quintile groups




Note: Equivalized disposable income quintiles in the baseline on the vertical axis; these are calculated including all individuals, as in Figure 2. Prevalent income is defined at the household level. 95% confidence intervals are reported for net indexation gains and disposable income changes related to the smallest groups only (public sector employees and self-employed) due to their greater variability. Indexation-induced changes and disposable income changes are derived from the comparison of the income distribution resulting from the baseline and the distribution obtained by running a steady-state counterfactual scenario in which no price growth occurs in the 2022–2023 period. Source: Authors' elaborations of EUROMOD outputs.

**Figure 4** Average change in effective PIT rates by prevalent income source and income groups




Note: Values in non-equivalized terms. Gross income subject to PIT in the baseline on the horizontal axis in thousands of euros. Prevalent income is defined at the individual level. 95% confidence intervals are reported. To ease comparability with official statistics, the disaggregation by income groups follows the same structure as in aggregate data on tax returns provided by the Italian Department of Finance (https://www1.finanze.gov.it/finanze/analisi_stat/public/index.php?tree=2023AAPFTOT020602). Source: Authors' elaborations of EUROMOD outputs.

## 4.3 Contribution of taxes and benefits to income redistribution

Table 5 reports the redistributive capacity of the Italian tax-benefit system, showing the values of the concentration index of pre-fiscal income and the Gini index of post-fiscal income, which amount to 37.9 and 30.4 points, respectively. The difference between these measures is referred to as the redistributive effect, which amounts to approximately 7.5 points: it is the difference between the vertical effect (10.3 points) and the horizontal effect (2.8 points). In a cross-country European perspective, the redistributive effect achieved in Italy is smaller than what we observe in Belgium, France, Germany and Sweden (where the effect is around 10 points), very similar to that of Spain, but higher than that in Greece and Poland (less than 5 points).[16] In line with the rest of the literature, Almeida (2020) reports Gini indices for income aggregates comparable to those reported here, showing that redistribution in the US is approximately 5-6 points. Similarly to the American case (Splinter, 2020), income redistribution and progressivity in Italy have increased over the decades (Baldini, 2021).

[16] The results on the redistributive effect across European countries are derived by the authors using EUROMOD and are available upon request.

**Table 5** Tax-benefit redistributive effect

| Indices | |
|---|---|
| Concentration index of pre-fiscal income ($C_{Y_g,Y_d}$) | 37.906 − (37.141, 38.553) |
| Gini index of post-fiscal income ($G_{Y_d}$) | 30.432 = (29.850, 30.949) |
| Redistributive effect ($\widetilde{RE}$), Eq. (5) | 7.474 = (7.175, 7.720) |
| Vertical effect ($\widetilde{VE}$), Eq. (6) | 10.307 − (10.004, 10.550) |
| Horizontal effect ($\widetilde{HE}$), Eq. (7) | 2.833 (2.703, 2.957) |

Note: Values are multiplied by 100 for layout purposes. 95% confidence intervals between brackets. Indices are calculated for the baseline scenario. The concentration coefficient of pre-fiscal income is calculated by ranking individuals based on their post-fiscal income from lowest to highest. Source: Authors' elaborations of EUROMOD outputs.

Table 6 reports tax-benefit contributions to the redistributive effect and their vertical and horizontal components. The panel "Net instruments" refers to the contribution of taxes and benefits net of indexation-induced amounts, while the panel "Indexation-induced changes" refers to the contribution of the change in taxes and benefits due to (lack of) indexation. The overall contribution of a given tax or benefit is the sum of the net instrument effect and the indexation-induced effect. When an increase in taxable income does not affect effective tax rates – as is the case of proportional taxes – the overall contribution is simply captured by the net instrument effect.

The first thing to note about the findings is that PIT alone accounts for more than half of the redistributive effect. This relates to the role that PIT has historically played in Italy as the main instrument to achieve redistribution more than social transfers. Second, the inequality-reducing effect of proportional taxes may at first appear counterintuitive. However, ownership of income components subject to flat rates is more frequent among better-off households and increases with disposable income. Third, SICs paid by self-employed present a rather regressive nature, which is mostly due to horizontal inequities and, therefore, to reranking. This is explained by the relatively high contribution rates faced by low-income self-employed, as they have to pay SICs on a minimum income threshold even if their actual income is lower. Finally, social assistance pensions, the minimum income benefit, and family allowances are the instruments that contribute the most to determining redistribution on the benefit side – slightly more than one third of the redistributive effect – and provide significant contributions to the horizontal effect as well. This is especially the case for social assistance pensions and the minimum income benefit, as recipient households are mainly concentrated among the poorest, and that is where reranking is more likely to take place as benefits make up a great share of poor households' disposable income.

Looking at indexation-induced changes, fiscal drag through PIT shows a small regressive effect amounting to –0.3% of the redistributive effect, which is due to a prevalent contribution of the horizontal inequity effect. The change in SICs has an inequality-reducing effect that offsets PIT fiscal drag's effect, with a contribution equal to 0.5%. This is mainly attributable to SICs paid by the self-employed, as the greater reduction in effective contribution rates is observed for the poorest income group. Finally, the change in pensions and social transfers contributes to the reduction of inequality with a contribution of 4.3%. The greatest contribution comes from social insurance pensions (1.9%),

whose redistributive effect is mainly determined by the contribution to the vertical effect, and from social assistance pensions and family allowances (1.2% and 1.1%, respectively). To provide context, a generalized increase in taxes by 15% (2.1% of GDP) would increase redistribution by roughly the absolute contribution of pensions and social transfers to the redistributive effect.[17]

**Table 6** Contribution of taxes and benefits to income redistribution

| Instruments | $\widetilde{RE}$ Abs. | % | $\widetilde{VE}$ Abs. | % | $\widetilde{HE}$ Abs. | % |
|---|---|---|---|---|---|---|
| Net instruments | | | | | | |
| Net taxes | – | 60.4 | – | 60.8 | – | 62.0 |
| Employee SICs | 0.635 (0.590, 0.679) | 8.5 – | 0.811 (0.766, 0.856) | 7.9 – | 0.176 (0.162, 0.190) | 6.2 – |
| Self-employed SICs | -0.600 (-0.709, -0.494) | -8.0 – | -0.042 (-0.146, 0.060) | -0.4 – | 0.558 (0.520, 0.597) | 19.7 – |
| Personal income tax | 4.150 (3.969, 4.309) | 55.5 – | 6.161 (4.671, 5.001) | 47.0 – | 0.884 (0.663, 0.730) | 24.6 – |
| Proportional taxes | 0.336 (0.289, 0.382) | 4.5 – | 0.375 (0.329, 0.421) | 3.6 – | 0.040 (0.031, 0.047) | 1.4 – |
| Municipal property tax | -0.004 (-0.055, 0.046) | -0.1 – | 0.280 (0.235, 0.325) | 2.7 – | 0.285 (0.256, 0.313) | 10.1 – |
| Net benefits | – | 35.1 | – | 34.9 | – | 33.8 |
| Social assistance pensions | 0.678 (0.610, 0.743) | 9.1 – | 1.187 (1.101, 1.267) | 11.5 – | 0.509 (0.459, 0.556) | 18.0 – |
| Family allowances | 0.967 (0.912, 1.017) | 12.9 – | 1.129 (1.066, 1.186) | 11.0 – | 0.163 (0.137, 0.185) | 5.7 – |
| Other social transfers | 0.048 (0.026, 0.070) | 0.6 – | 0.120 (0.089, 0.151) | 1.2 – | 0.071 (0.040, 0.104) | 2.5 – |
| Minimum income benefit | 0.934 (0.813, 1.035) | 12.5 – | 1.149 (1.010, 1.266) | 11.2 – | 0.215 (0.187, 0.240) | 7.6 – |
| Indexation-induced changes | | | | | | |
| Changes in taxes ($\Delta F$ or fiscal drag) | – | 0.2 | – | 0.4 | – | 0.7 |
| Employee SICs | 0.007 (0.003, 0.011) | 0.1 – | 0.011 (0.008, 0.014) | 0.1 – | 0.004 (0.003, 0.006) | 0.2 – |
| Self-employed SICs | 0.031 (0.028, 0.034) | 0.4 – | 0.020 (0.017, 0.023) | 0.2 – | -0.010 (-0.011, -0.010) | -0.4 – |
| Personal income tax | -0.021 (-0.028, -0.014) | -0.3 – | 0.005 (-0.002, 0.012) | 0.1 – | 0.026 (0.023, 0.028) | 0.9 – |
| Changes in benefits ($\Delta B$) | – | 4.3 | – | 4.0 | – | 3.6 |
| Social insurance pensions | 0.138 (0.121, 0.156) | 1.9 – | 0.176 (0.158, 0.194) | 1.7 – | 0.037 (0.032, 0.044) | 1.3 – |
| Work-replacement benefits | -0.001 (-0.003, 0) | 0 – | -0.001 (-0.003, 0) | 0 – | 0 (-0.001, 0) | 0 – |
| Social assistance pensions | 0.089 (0.082, 0.096) | 1.2 – | 0.133 (0.125, 0.142) | 1.3 – | 0.044 (0.040, 0.048) | 1.6 – |
| Family allowances | 0.082 (0.077, 0.087) | 1.1 – | 0.095 (0.089, 0.101) | 0.9 – | 0.013 (0.011, 0.015) | 0.5 – |
| Other social transfers | 0.005 (0.003, 0.008) | 0.1 – | 0.012 (0.009, 0.014) | 0.1 – | 0.006 (0.004, 0.009) | 0.2 – |
| Total | 7.474 (7.175, 7.720) | 100.0 – | 10.307 (10.004, 10.550) | 100.0 – | 2.833 (2.703, 2.957) | 100.0 – |

Note: Relative contributions are reported under the column headed with "%". 95% confidence intervals between brackets. Net instruments and indexation-induced changes are derived from the comparison of the income distribution resulting from the baseline and the distribution obtained by running a steady-state counterfactual scenario in which no price growth occurs in the 2022–2023 period. Source: Authors' elaborations of EUROMOD outputs.

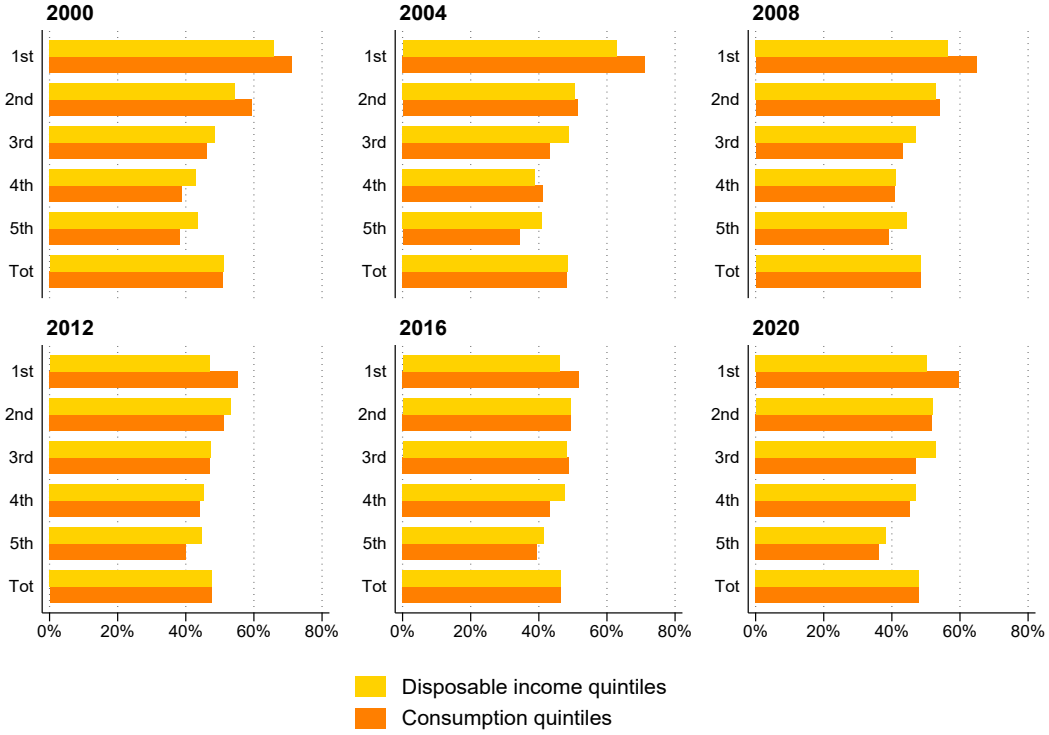
[17] On the other hand, a generalized decrease in taxes by 11% would decrease the redistributive effect by roughly the same contribution. The fact that a change in taxes of the same magnitude but different sign does not result in an equivalent change in income redistribution depends on the contribution of the average tax rate to explaining redistribution (Kakwani, 1977). As a result, a generalized change in benefits would have a lower impact as benefits weigh less in aggregate terms compared to taxes.

### 4.4 Potential limitations and robustness checks

A critical consideration in analyzing the distributional impact of pension indexation is the potential for life-cycle effects to introduce bias into conclusions drawn from annual income comparisons, particularly by misrepresenting the relative well-being of retirees. Starting from the seminal contribution of Modigliani and Brumberg (2013), according to which, in a life-cycle model, retirees' consumption exceeds their income and workers' income exceeds their consumption, we reviewed the recent empirical literature, which suggests that the "Wealth Decumulation Puzzle" applies to Europe and Italy. Yuji Horioka and Ventura (2024) find that one of the reasons why the elderly do not decumulate their wealth is the generosity of the public pension system, which is especially relevant in the Italian case. Building on this literature, we opted for further data analysis to understand whether the use of consumption rather than income would significantly change the distribution of retiree households by quintiles. This would prove the life-cycle expected pattern if consumption quintiles showed a frequency of retiree households that decreases with higher levels of consumption, or, at the very least, showed a distribution that differs substantially from that obtained with income quintiles. For this purpose, we employ data from the Survey on Household Income and Wealth (SHIW), released by the Bank of Italy.[18] Our analysis of SHIW data shows no substantial change in the frequency of retiree households by quintiles when considering income or consumption, as shown in Figure 5, suggesting that the distributive impact of pension indexation is not significantly altered toward regressivity. This finding holds irrespective of whether our definition of retiree households includes households with at least one retired member or focuses on households where all members are retired.

[18] SHIW is an alternative survey to EU-SILC used for tax-benefit microsimulation in Italy (Ceriani et al., 2013). It provides freely available data primarily on wealth and income, but also on consumption, unlike the input data for the EUROMOD model for Italy currently used in this paper.

**Figure 5** Frequency of households with al least one retiree by quintiles




Note: Values in non-equivalized terms. The bars represent the share of retiree households in each quintile. Source: Authors' elaborations of SHIW data.

Related to the point above, we also assess how the impact of inflation on lifetime income through retirement benefits affects our findings. According to Italian rules, pension formulas are based on inflation-indexed wages and nominal GDP-indexed contributions, with indexation applying up to two years before retirement. We simulate pension calculations for a 65-year-old male employee retiring in 2019 after 40 years of work, assuming that wages increase at half the inflation rate. Removing inflation indexation from earnings and using real GDP for contributions results in a monthly pension lower by 12%. This reduction holds across different earnings percentiles. Over a 19-year life expectancy, assuming a pension indexation rate equal to 2%, the nominal lifetime income reduction would be approximately 4%. Although we do not know how this reduction would affect the distributive analyses in our paper, we conclude that lifetime effects are not substantial enough to question the inequality-reducing effect of pension indexation.

At the same time, we believe that relaxing the assumption on fixed behaviors in response to fiscal shocks would not significantly affect the amount of redistribution channeled through indexation. Most retirees are unlikely to show any response, as they have no control over pension benefits. Second, it is reasonable to assume that responses would be primarily driven by fiscal drag rather than benefit changes for those who work and are simultaneously entitled to social transfers. The most common case is that of a worker entitled to family allowances due to having children. It seems unlikely that responses would be based on a joint consideration, given that benefit changes are delayed[19] and considering the inherent complexity of the joint assessment. If responses are driven by fiscal drag, then we should look for spikes in effective marginal tax rates. We do not observe excessive

[19] Specifically, fiscal drag would exert its effect in the same year that wages adjust to inflation, whereas benefit changes would occur in subsequent years because means testing is based on incomes from two years prior to benefit receipt.

deviations relative to statutory PIT rates that would trigger significant responses, except for specific segments of the income distribution among low-to-middle-income employees. However, Villamaina and Acciari (2023) found that very high effective marginal tax rates in Italy, resulting from a highly debated tax policy, had no effect on labor effort. The weak wage growth that has long characterized Italy, as documented by Franzini and Raitano (2019) and Bavaro and Raitano (2024), may contribute to explaining the lack of response to fiscal shocks that would be expected to negatively impact labor supply.

Furthermore, in order to quantify the potential effect of different policy interpretations and the impact of indexation-induced changes on overall government revenue under different tax-benefit rules, in Appendix E we report the results of robustness exercises where we consider: *i*) the recent reductions of pension contribution rates for employees as an inflation-dependent policy change to maintain their purchasing power; *ii*) the tax-benefit system fully unindexed to inflation; and *iii*) the tax-benefit system fully indexed. In scenario *i*), the net indexation gain would amount to 1.22% of GDP in 2023, largely due to a revenue decrease from SICs paid by employees, which in turn increases PIT fiscal drag. This implies that indexation-induced tax changes would contribute to widening the resources needed to keep up with inflation. Employee SICs would display a significantly increased inequality-reducing effect, while PIT fiscal drag would be slightly more regressive. Retirees would maintain a purchasing power advantage over private sector employees, but to a lesser extent. In scenario *ii*) and *iii*), the net indexation gain would range from a 1.11% of GDP (no indexation) to a -0.98% of GDP (full indexation). Social insurance pensions are the key driver in the no-indexation scenario, while PIT fiscal drag dominates in the full-indexation scenario.

# 5 Conclusions

In this paper, we take advantage of the recent context of high inflation and upward wage rigidity in Italy to shed light on the contribution of fiscal drag and benefit indexation to income redistribution. We provide evidence on how indexation-induced changes in tax revenue and benefit expenditure are distributed among individuals. Building on the identification of inflation-dependent tax-benefit rules through a microsimulation approach, we propose a comprehensive methodology for the study of indexation-induced income changes that can also be applied to other countries.

We estimate that the net sum of resources induced by inflation – through benefit indexation and fiscal drag – can be summed up to 0.75% of GDP in 2023 (€15.7 billion), almost compensated by the same amount of additional tax revenue due to the increased taxable income. The greatest contributions are from social insurance pensions (0.88%) and PIT (-0.35%). In the context of surging prices and upward wage rigidity, with benefits generally indexed to inflation while most tax rules are left unindexed, which is a context shared by many developed countries, we observe that retirees are advantaged over private sector employees in terms of purchasing power protection: the increase in nominal disposable income between these groups widens by 2.2 percentage points in a single year. As for income redistribution, the inequality-reducing effect of benefit indexation is 4.3% of the redistributive capacity of the tax-benefit system, when the contribution of indexation for social insurance pensions is equal to 1.9%. No short-term benefit erosion is foreseen due to the backward-looking structure of means-testing procedures for social transfers, which consider incomes from one or two years prior to benefit receipt. PIT fiscal drag has a limited inequality-increasing effect equal to -0.3%, which is mostly attributable to

unequal treatments of equals (i.e. horizontal inequity). However, the indexation-induced changes in SICs has an equalizing effect, with a contribution of 0.5%, mainly due to self-employment income that grows faster than inflation in a framework of inflation-dependent thresholds for SIC payments.

Our paper contributes to the policy debate on the implications of inflation and highlights the scope for further developments. First, our quantification of budgetary and redistributive effects may help governments understand how inflation affects different groups, in addition to the effects of income and price policies implemented to protect the purchasing power of households (Amores et al., 2024). Second, although we do not consider the detrimental effect of the devaluation of nominal wealth, which is generally greater for the elderly (Chafwehé et al., 2024), the focus on the effects on disposable income points out that the elderly benefit more directly from the indexation-induced redistribution operated through the tax-benefit system. Third, Italy offers a unique opportunity to test the simulations against administrative data once available, by exploiting the differentiated price variations assessed throughout the country and the heterogeneity of tax rules at the regional and municipal levels (Alpino et al., 2022).

# References


Almeida, V. (2020). Income inequality and redistribution in the aftermath of the 2007–2008 crisis: the us case. *National Tax Journal*, 73(1): 77–114.

Alpino, M., Asatryan, Z., Blesse, S., and Wehrhöfer, N. (2022). Austerity and distributional policy. *Journal of Monetary Economics*, 131: 112–127.

Amores, A., Basso, H. S., Bischl, S., Agostini, P. D., Poli, S. D., Dicarlo, E., Flevotomou, M., M. Freier, S. M., García-Miralles, E., Pidkuyko, M., Ricci, M., and Riscado, S. (2024). Inflation, Fiscal Policy, and Inequality: The Impact of the Post-Pandemic Price Surge and Fiscal Measures on European Households. *Review of Income and Wealth*, 71(1): 1–24.

Baldini, M. (2021). Redistribution and progressivity of the Italian personal income tax, 40 years later. *Fiscal studies*, 42(2): 345–366.

Barbetta, G., Pellegrino, S., and Turati, G. (2018). What explains the redistribution achieved by the Italian personal income tax? Evidence from administrative data. *Public Finance Review*, 46(1): 7–28.

Bargain, O. (2014). Decomposing Changes in Income Distribution, In C. O'Donoghue (Ed.), *Handbook of microsimulation modelling: Vol. 239* (pp. 47–75). Emerald Group Publishing Limited, Leeds.

Bavaro, M. and Raitano, M. (2024). Is working enough to escape poverty? Evidence on low-paid workers in Italy. *Structural Change and Economic Dynamics*, 69: 495–511.

Ceriani, L., Figari, F., and Fiorio, C. (2024). EUROMOD Country Report: Italy, 2020-2023. *Publications Office of the European Union*.

Ceriani, L., Fiorio, C. V., and Gigliarano, C. (2013). The importance of choosing the data set for tax-benefit analysis. *International Journal of Microsimulation*, 6(1): 149–168.

Chafwehé, B., Ricci, M., and Stohlker, D. (2024). The impact of the cost-of-living crisis on european households. *JRC Working Papers on Taxation and Structural Reforms* No. 1.

Curci, N., Savegnano, M., Zevi, G., and Zizza, R. (2022). The redistributive effects of inflation: a microsimulation analysis for Italy. *Bank of Italy Working Paper* No. 738.

Di Caro, P. (2020). Decomposing personal income tax redistribution with application to Italy. *Journal of Economic Inequality*, 18: 113–129.

Franzini, M. and Raitano, M. (2019). Earnings inequality and workers' skills in Italy. *Structural Change and Economic Dynamics*, 51: 215–224.

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

Gornick, J. and Smeeding, T. (2018). Redistributional Policy in Rich Countries: Institutions and Impacts in Nonelderly Households. *Annual Review of Sociology*, 49: 441–468.

Guillaud, E., Olckers, M., and Zemmour, M. (2018). Four levers of redistribution: The impact of tax and transfer systems on inequality reduction. *Review of Income and Wealth*, 66(2): 444–466.

Immervoll, H. (2005). Falling up the stairs: The effects of "bracket creep" on household incomes. *Review of Income and Wealth*, 51(1): 37–62.

Italian Parliamentary Budget Office (2024). 2024 budget manoeuvre: PBO's analysis of the final legislative texts. Available at https://en.upbilancio.it/focus-paper-no-2-15-february-2024/.

Kakwani, N. C. (1977). Measurement of tax progressivity: an international comparison. *The Economic Journal*, 87(345): 71–80.

Kakwani, N. C. (1984). On the measurement of tax progressivity and redistribution effect of taxes with applications to horizontal and vertical equity. *Advances in Econometrics*, 3: 149–168.

Lerman, R. I. and Yitzhaki, S. (1985). Income inequality effects by income source: A new approach and applications to the United States. *The Review of Economics and Statistics*, 67(1): 151–156.

Lerman, R. I. and Yitzhaki, S. (1995). Changing ranks and the inequality impacts of taxes and transfers. *National Tax Journal*, 48: 45–59.

Levy, H., Nogueira, J., Siqueira, R., Immervoll, H., and O'Donoghue, C. (2010). Simulating the impact of inflation on the progressivity of personal income tax in Brazil. *Revista Brasileira de Economia*, 64(4): 405–422.

Li, J., O'Donoghue, C., Loughrey, J., and Harding, A. (2014). Static Models. In *Handbook of microsimulation modelling*, pages 47–75. Emerald Group Publishing Limited.

Modigliani, F. and Brumberg, R. (2013). Utility Analysis and the Consumption Function: An Interpretation of Cross-Section Data 1. In *Post-keynesian economics*, pages 388–436. Routledge.

OECD (2023). *Taxing Wages 2023: Indexation of Labour Taxation and Benefits in OECD Countries*. OECD Publishing, Paris.

Pallotti, F., Paz-Pardo, G., Slacalek, J., Tristani, O., and Violante, G. L. (2024). Who bears the costs of inflation? Euro area households and the 2021-2023 shock. *Journal of Monetary Economics*.

Paulus, A., Sutherland, H., and Tasseva, I. (2020). Indexing out of poverty? Fiscal drag and benefit erosion in cross-national perspective. *Review of Income and Wealth*, 66(2): 311–333.

Splinter, D. (2020). Us tax progressivity and redistribution. *National Tax Journal*, 73(4): 1005–1024.

Sutherland, H., Evans, M., Hancock, R., Hills, J., and Zantomio, F. (2008). *The impact of benefit and tax uprating on incomes and poverty*. Joseph Rowntree Foundation.

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

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

Villamaina, L. and Acciari, P. (2023). Taxation and labour supply decisions: an evaluation of the earned income tax credit in Italy. *Italian Department of Finance Working Papers* No. 20.

Yuji Horioka, C. and Ventura, L. (2024). Do the retired elderly in Europe decumulate their wealth? The importance of bequest motives, precautionary saving, public pensions, and homeownership. *Review of Income and Wealth*, 70(1): 187–212.

# Appendix A Inflation-dependent tax-benefit rules for 2023

*Social insurance pensions (Sip)*
The indexation mechanism of social insurance pensions is complete up to low-middle pension levels and only partial for higher pension benefits. As such it entails a redistributive element in favor of low-pension recipients. For the sake of clarity, we provide the details of the indexation mechanism in 2023:

$$wp_{2023} = \left\{ \begin{array}{c} wp_{2022} * (1+r)\,,\ if\ wp_{2022} \leq 4 * mp_{2022} \\ wp_{2022} * [1+(r*85\%)]\,,\ if\ wp_{2022} > 4 * mp_{2022}\ and\ wp_{2022} \leq 5 * mp_{2022} \\ wp_{2022} * [1+(r*53\%)]\,,\ if\ wp_{2022} > 5 * mp_{2022}\ and\ wp_{2022} \leq 6 * mp_{2022} \\ wp_{2022} * [1+(r*47\%)]\,,\ if\ wp_{2022} > 6 * mp_{2022}\ and\ wp_{2022} \leq 8 * mp_{2022} \\ wp_{2022} * [1+(r*37\%)]\,,\ if\ wp_{2022} > 8 * mp_{2022}\ and\ wp_{2022} \leq 10 * mp_{2022} \\ wp_{2022} * [1+(r*32\%)]\,,\ if\ wp_{2022} > 10 * mp_{2022} \end{array} \right\} \quad \text{(A1)}$$

where $wp_{2023}$ ($wp_{2022}$) is the sum of old-age/seniority pensions, survivors' pensions and incapacity pensions – that is, social insurance pensions – in 2023 (2022); $r = 8.1\%$ is the indexation rate; and $mp_{2022}$ is the minimum pension amount, equal to €525.38 per month in 2022 and increased according to $r$ for the following year. This is the threshold fixed by law up to which pensions are subject to top up, conditional on a means-testing procedure that takes account of the spouse's income. The increase to account for inflation is proportionally distributed among the pensions included in *wp*. Furthermore, pensions below or equal to the minimum pension in 2023 were temporarily increased by 1.5% for recipients below 75 years of age and by 6.4% otherwise. This further increase was granted as an extraordinary measure to alleviate the cost of living under the current high inflation regime. However, the indexation mechanism has undergone various changes throughout the last 30 years, suggesting that partial adjustments to inflation for social insurance pensions are intended as a tool to cope with year-to-year public finance contingencies.

*Social insurance contributions (SICs)*
The rules for the payment of SICs on earned income differ according to the income source (*i.e.* employment income, income from temporary jobs or self-employment income), sector of activity, number of working individuals at the firm level and job position. The contribution base for SICs cannot be lower (higher) than a minimum (maximum) threshold mandated by law for both employees and self-employed. SICs are borne by employers to the extent of roughly three-fourths of the overall amount due, with employees being responsible for the remaining portion. Self-employed are subject to contribution rates and rules that vary according to the professional pension fund they contribute to. Without claiming to be exhaustive, below we summarize the calculation of pension contributions for full-year working individuals on a yearly basis, taking as reference the rules for SICs paid by employees in industrial firms with 15-50 employees; for the self-employed, we report the SICs due by craftsmen, but similar contribution rates and thresholds also apply to retailers and farmers.

$$SICs^{e}_{2023} = \left\{ \begin{array}{c} 11,813 * 4.19\%,\ if\ gw_{2023} \leq 11,813 \\ gw_{2023} * 4.19\%,\ if\ gw_{2023} > 11,813\ and\ gw_{2023} \leq 25,000 \\ gw_{2023} * 5.19\%,\ if\ gw_{2023} > 25,000\ and\ gw_{2023} \leq 35,000 \\ gw_{2023} * 9.19\%,\ if\ gw_{2023} > 35,000\ and\ gw_{2023} \leq 52,190 \\ 52,190 * 9.19\% + (gw_{2023} - 52,190) * 10.19\%,\ if\ gw_{2023} > 52,190\ and\ gw_{2023} \leq 113,520 \\ 52,190 * 9.19\% + (113,520 - 52,190) * 10.19\%,\ if\ gw_{2023} > 113,520 \end{array} \right\} \quad \text{(A2)}$$

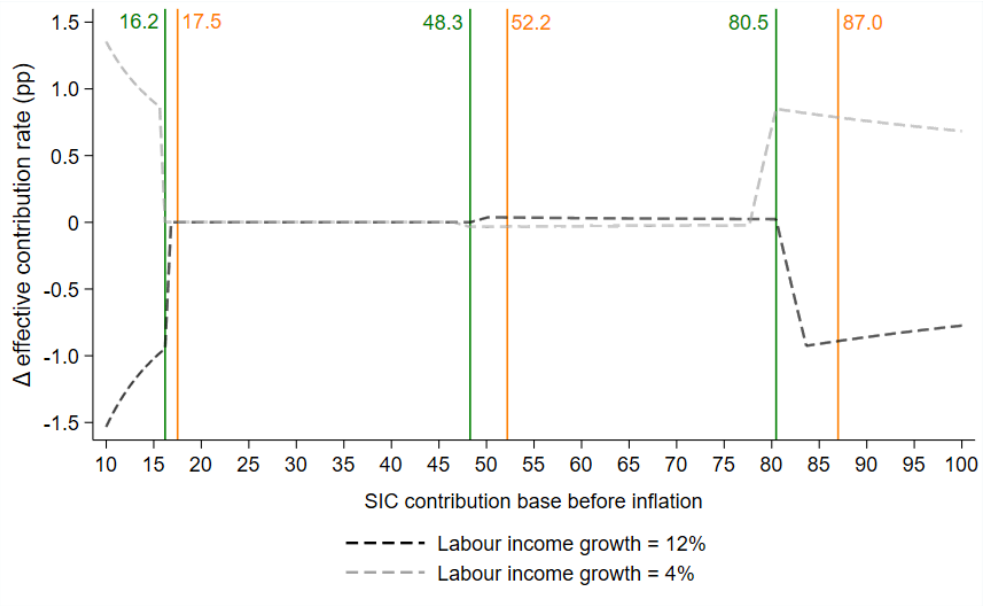
$$SICs^{se}_{2023} = \left\{ \begin{array}{c} 17,504 * 24\%,\ if\ yse_{2023} \leq 17,504 \\ yse_{2023} * 24\%,\ if\ yse_{2023} > 17,504\ and\ yse_{2023} \leq 52,190 \\ 52,190 * 24\% + (yse_{2023} - 52,190) * 25\%,\ if\ yse_{2023} > 52,190\ and\ yse_{2023} \leq 86,983 \\ 52,190 * 24\% + (86,983 - 52,190) * 25\%,\ if\ yse_{2023} > 86,983 \end{array} \right\} \quad \text{(A3)}$$

where $SICs^{e}_{2023}$ and $SICs^{se}_{2023}$ are the contributions due by employees and self-employed, respectively; $gw_{2023}$ is the monthly wage before employee-side contributions and PIT withholdings; $yse_{2023}$ is self-employment income after deducting activity-related costs; and the conditions in Eqs. (A2) and (A3) stand for the SIC inflation-dependent thresholds in force in 2023, which are updated based on $r$. For self-employed with an age equal to or below 21 years, the contribution rates in Eqs. (A3) are reduced by 1.2 percentage points. Finally, workers in temporary jobs (*i.e.* atypical workers or *co.co.co.*, according to the Italian acronym) are subject to a contribution rate of 11.67%, and contributions are not due for income above €113,520 in annual terms, which is also the maximum threshold in Eqs. (A2).

In a pay-as-you-go system like the Italian one, retirement benefits are borne by current workers through the payment of SICs. If pension amounts are indexed to inflation, even if only partially, it seems reasonable that SIC thresholds vary accordingly in order to neutralize pension expenditure increases. However, as salaries generally do not adjust immediately to inflation spikes, revenue neutrality is hard to achieve in practice without further interventions.

Figure A1 provides an example of the interplay between income growth and contribution rules applied to SICs paid by self-employed. Following an inflation-dependent increase in the SIC contribution base, if income grows at a slower pace than $r$, then the taxpayers at the two ends of the distribution – where the minimum and maximum contribution thresholds lay – pay lower contribution rates, and vice versa. In contrast, the taxpayers between the intermediate threshold and the maximum threshold pay a slightly higher rate, and vice versa. This shows that the decrease in relative liabilities due to inflation-dependent adjustments – what we define as reverse fiscal drag – is as theoretically plausible as fiscal drag in a framework with minimum and maximum thresholds.

**Figure A1** (Reverse) Fiscal drag through self-employed SICs




Note: The solid green (orange) lines represent the income thresholds set for the payment of self-employed SICs before (after) indexation, taking $r = 8.1\%$. Values on the horizontal axis in thousands of euros. Source: Authors' elaborations.

*The social pension*

The social pension (*i.e. Assegno sociale*) is a tax-free social assistance benefit targeted to mostly non-disabled poor individuals with an age equal to or above 67 years (*i.e.* the current age requirement for the old-age retirement scheme). As such, no contributory history is required. Other eligibility conditions include citizenship – conditioning receipt upon specific legal requirements for non-Italian citizens – and residence status. The monthly allowance depends on previous year's amount, fully inflation-indexed according to $r$, for a maximum amount of €503.27 in 2023. Like most pension benefits, it is paid for 13 months. The income thresholds for means-testing purposes are also updated based on $r$. The means-tested income refers to $t-1$, except for new recipients, whose income refers to the same year of benefit receipt ($t$). In what follows, we summarize the calculation of the social pension:

$$sp^{UM}_{2023} = \left\{ \begin{array}{c} 0, \ if \ ysp^{I}_{2022} \geq 6,542.51 \\ \underbrace{(6,542.51 - ysp^{I}_{2022})/13}_{sp^{I}}, \ if \ ysp^{I}_{2022} \geq 0 \ and \ ysp^{I}_{2022} < 6,542.51 \end{array} \right\} \tag{A4}$$

$$sp^{M}_{2023} = \left\{ \begin{array}{c} 0, \ if \ ysp^{I}_{2022} \geq 6,542.51 \ or \ ysp^{C}_{2022} \geq 13,085.02 \\ min(sp^{I}, \ \underbrace{(13,085.02 - ysp^{C}_{2022})/13}_{sp^{C}}), \ if \ ysp^{I}_{2022} < 6,542.51 \ and \ ysp^{C}_{2022} < 13,085.02 \end{array} \right\} \tag{A5}$$

where $sp^{UM}_{2023}$ and $sp^{M}_{2023}$ are the benefit amounts for unmarried and married individuals, respectively; $ysp^{I}_{2022}$ is the reference income[20] for means testing at the individual level. For married recipients, besides complying with means testing at the individual level, the

[20] The income subject to means testing is the sum of all income sources except one-third of social insurance pensions computed under the pay-as-you-go system, the arrears subject to separate taxation, the redundancy benefit, family allowances, the cadastral value of the main residence, the social pension, the accompanying benefit, allowances related to disabilities and the war pension.

sum of the spouses' reference income ($ysp^C_{2022}$) must be lower than the upper-income threshold in Eqs. (A5), and the benefit amount is the lowest amount obtained between the individual-level computation ($sp^I$) and the couple-level computation ($sp^C$).

*Disability benefits*
Disability benefits are granted to Italian citizens and foreigners holding long-term residence permits with reduced work ability and without any contributory history, in contrast to incapacity pensions, where recipients are individuals with a contributory history of at least five years (three out of five paid in the five years preceding the pension request). Additional conditions other than citizenship status and past working status also apply relative to the type of disability benefit under consideration, such as age, disability extent and working ability. These benefits are generally means tested – and the reference year for income subject to means testing refers to the year of benefit receipt ($t$) for new recipients or $t-1$ otherwise – and fully inflation-indexed according to $r$. The legislation on disability benefits is rather fragmented. We refer the reader to Ceriani et al. (2024) for a brief summary of the main disability benefits foreseen by the Italian legislation and relevant conditions for receipt.

*Unemployment benefits and wage compensation schemes*
The system of benefits related to the end and temporary suspension of work activity targets employees and atypical workers. Specific and more favorable rules apply to employees in the agricultural sector with respect to eligible individuals in other sectors. We limit our focus to ordinary measures, these being the most sizeable in terms of expenditure and the most common among employees.

The ordinary unemployment benefit (*Nuova prestazione di Assicurazione Sociale per l'Impiego*, NASpI) is granted to employees who have paid contributions to unemployment insurance for at least 13 weeks in the previous four years and have worked 30 days in the year before the date of work suspension. Further conditions concern the cause of dismissal and resignation in specific cases where the employee resigns due to good cause. The benefit is granted for up to half of the number of contribution weeks in the previous four years and is reduced monthly by 3% after the fourth month. In what follows, we briefly outline the calculation of the benefit.

$$ub_{2023} = \begin{cases} \overline{wg} * 0.75, \ if \ \overline{wg} \leq 1,352.19 \\ min\left(1,352.19 * 0.75 + (\overline{wg} - 1,352.19) * 0.25, 1,470.99\right), \ if \ \overline{wg} > 1,352.19 \end{cases} \tag{A6}$$

where $\overline{wg}$ is the four-year backward average monthly wage before employee social contributions and PIT withholdings; amounts and thresholds in Eqs. (A6) are updated yearly to account for inflation based on $r$. The benefit cannot exceed a maximum amount – equal to €1,470.99 in 2023 – and is subject to SIC with a rate of 5.84% and also to PIT. The benefit formula is embedded with a regressive element as only individuals with $\overline{wg}$ close to or above pre-adjusted thresholds experience an increase in the benefit amount due to inflation, supposing that $\overline{wg}$ is little or no affected.

The ordinary wage compensation scheme (*Trattamento di integrazione salariale ordinaria*, CIGO) is a measure intended to lessen the impact of negative macroeconomic conditions by allowing firms to retain workers on reduced-hour schedules instead of opting for dismissal. Eligibility conditions apply at the firm level, and all employees of a beneficiary firm can be subject to the scheme. The benefit amounts to 80% of the wage lost

for job suspension, up to a maximum monthly threshold updated to inflation according to $r$, which is equal to €1,321.53 in 2023. The same contribution rate as the ordinary unemployment benefit applies, and the benefit is taxable. Also in this case, the benefit formula favors only middle- and high-income earners among retained workers.

*Family allowances*
Family allowances have recently undergone a major revision in Italy. From March 2022, the introduction of the Universal Children Allowance (*Assegno unico e universale*, AUU) has replaced a number of measures for the support of parenthood and childbearing. The new system overcomes issues related to welfare selectivity according to the income level and working status of the applicant household member, as self-employed with dependent children have historically been excluded. The benefit varies based on a means-testing criterion that accounts for both income and wealth at the household level (*Indicatore della Situazione Economica Equivalente*, ISEE).[21] The reference year for means-tested income and wealth assets refers to $t-2$ with respect to the year of benefit receipt ($t$). The base amount per dependent child, which varies according to child characteristics and the number of children in the household, is constant up to an ISEE value of €16,215 and then decreases gradually up to an ISEE value of €43,240, where the minimum amount is set. Specific increases apply on top of base amounts and refer to the extent of disability among dependent children, the number of children, the working status of both parents and the mother's age. Both benefit amounts and thresholds for means testing are updated with the rate $r$, in line with most inflation-indexed social transfers.

Not all the family benefits previously in force have been totally replaced by the introduction of AUU. The main measure aimed at supporting households without children but with specific requirements in terms of household composition and the disability status of certain members is still active. The *Assegno per il Nucleo Familiare* (ANF) targets households with employees, retired employees and unemployed individuals and with a household income below inflation-indexed thresholds updated according to $r$. The uprating of thresholds and benefit amounts has effects from July 1st of a given year ($t$) to June 30th of the following year ($t+1$). The relevant income for means testing refers to $t-1$ and is valid for benefit receipt until June 30th in $t+1$ (before the subsequent adjustment to inflation). The means-testing procedure does not take into account wealth assets, and relevant income is a less comprehensive aggregate with respect to that employed for AUU.

*PIT and related surtaxes, and the substitute tax regime on self-employment income*
The Italian PIT – known as *IRPEF*, *Imposta sul reddito delle persone fisiche* – does not adjust tax brackets and income/expenditure thresholds for deductions and tax credits to inflation. Since its introduction in 1974, several changes have followed regarding the exclusion of certain income components from the tax base and their contextual subjection to substitute proportional tax regimes (e.g. self-employment income subject to the *regime*

[21] The ISEE means-testing criterion is calculated as follows: $ISEE = (ISR + 20\% * ISP)/EQ$. $ISR$ is the index that accounts for income and is the sum of all gross household income components net of SICs and a series of allowances related to alimony payments, health expenses for disabled relatives, labor income costs, the rent for households living in rental accommodation and household members' disability status. $ISP$ is the sum of household wealth components, including both financial and housing assets, net of specific asset-related deductions and allowances. $EQ = nh^{0.65}$ is the equivalence scale for households with fewer than six members, with $nh$ equal to the number of household members; for households with more members, $EQ = 5^{0.65} + (nh-5) * 0.35$. Additional increases apply to the equivalence scale according to the number of children, presence of underage children and parents' working status.

*forfetario*, rental income, productivity bonuses, etc). The gradual exclusion of these income sources from the PIT base has not only contributed to limiting the application of progressivity to specific categories (*i.e.* employees and retirees) but has also confined the adverse effect of fiscal drag on these same categories.

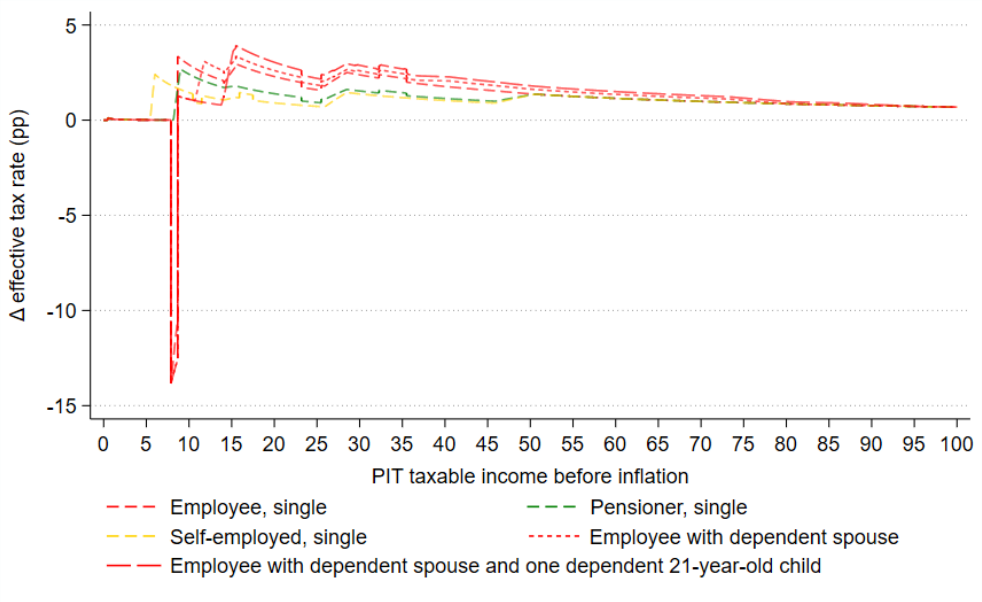
The calculation of PIT is summarized in Eqs. (A7) for the 2023 year. Taxable income ($Y_t$) is obtained by subtracting deductions ($D$) from gross income ($Y_{PIT}$). Next, the determination of gross tax liability ($T_g$) is made by multiplying the set of tax rates ($t$) by taxable income. Finally, the net tax liability ($T_n$) is given by subtracting tax credits ($C$) from $T_g$.

$$Y_{PIT} - D = Y_t,\ Y_t * t = T_g,\ T_g - C = T_n$$

$$t = \left\{ \begin{array}{c} 23\% :\ 0 < Y_t \leq 15.000 \\ 25\% :\ 15.000 < Y_t \leq 28.000 \\ 35\% :\ 28.000 < Y_t \leq 50.000 \\ 43\% :\ Y_t > 50.000 \end{array} \right\} \tag{A7}$$

Deductions and tax credits are crucial elements in the calculation of liabilities due. While the former represents roughly €34.4 billion according to tax return statistics for 2021, most of which comes from SICs paid by self-employed (€17.1 billion) and the cadastral value of the main residence (€9.2 billion), tax credits represent almost twice as much (€66.6 billion). However, despite the plethora of tax credits characterising the present system of personal taxation, only a few contribute significantly (on average) to reducing gross liabilities. Tax credits for labor or retirement income comprise the bulk of total tax credits, for a value of €44.8 billion. On the other hand, tax credits for dependent family members also play a significant role in lowering the liabilities of specific groups of the population, amounting to €11.4 billion. The erosion of resources induced by fiscal drag is further aggravated by the decreasing structure of the tax credits for income sources and dependent family members as gross income increases.

**Figure A2** (Reverse) Fiscal drag through PIT




Note: Effective net tax rates are derived by subtracting the *Bonus IRPEF* from PIT burden. The above examples are based on full-year working or retired taxpayers whose taxable income is made up of labor or retirement income only. Parents of children younger than 21 years of age are not entitled to the dependent children tax credit. Values on the horizontal axis in thousands of euros. Source: Authors' elaborations.

Strictly related to PIT is the *Bonus IRPEF*, which is a non-indexed in-work benefit for employees and atypical workers with gross income subject to PIT lower than €15,000 and with gross PIT liabilities net of the earned income tax credit ($T_g^M$) higher than zero. It consists of an amount equal to €100 per month at work. The interplay between the PIT structure and the bonus may yield reverse fiscal drag. Figure A2 shows the difference in effective net PIT rates for representative taxpayers following a ten-percent inflation-dependent increase in labor or retirement income. We observe that employees whose increase in taxable income leads to positive $T_g^M$ – that is, when taxable income overtakes €8,145, which corresponds to the no-tax area threshold for single employees – present lower effective tax rates up to a taxable income after inflation of roughly €9,000. The incidence of fiscal drag generally decreases with increasing taxable income starting from low-to-middle-income positions, reflecting the logarithmic shape of the tax incidence curve.

PIT surtaxes at the regional and municipal levels can also present a progressive structure. Their payment is limited to taxpayers with positive PIT liabilities and a taxable income higher than exemption thresholds set at the sub-national level, with $Y_t$ being the tax base for both surtaxes. The base tax rate of the regional surtax is set to 1.23% and can be increased up to 3.33%, while the tax rate of the municipal surtax cannot exceed 0.8%. It is possible to differentiate tax rates in such a way that high-earning taxpayers pay a higher amount, but this must be done by setting tax rates according to the income brackets presented in Eqs. (A7).

The substitute tax regime for self-employment income – currently known as the *regime forfetario* – was introduced in 2001 and has seen several modifications and a gradual loosening of eligibility requirements. The maximum sales volume in order to opt for the tax regime in the current year amounts to €85,000 and refers to the previous year. The tax liability is calculated by applying a tax rate of 15% on earnings net of activity costs and SICs. The tax rate is reduced to 5% for the first five business years in the case of

taxpayers meeting specific requirements, that is, business was not carried out during the previous three years or was not the continuation of an activity previously carried out in the form of salaried employment. Roughly one third of self-employed opt for the substitute tax regime rather than PIT. The backward-looking structure of the access mechanism delays the possible exclusion from the tax regime to the subsequent year.

# Appendix B Uprating factors

| Index | Baseline | | | Counterfactual | | | Source | Main uses |
|---|---|---|---|---|---|---|---|---|
| | 2021 | 2022 | 2023 | 2021 | 2022 | 2023 | | |
| Employment income index, private sector | 102.4 | 103.4 | 105.9 | 102.4 | 102.4 | 102.4 | Index for contractual hourly wages in the private sector (ISTAT); yearly variation | Employment income, private pensions, fringe benefits, arrears and severance pay, income from temporary jobs, private transfers, maintenance payments, income of children under 16 |
| Employment income index, public sector | 102.1 | 103.1 | 108.8 | 102.1 | 102.1 | 102.1 | Index for contractual hourly wages in the public sector (ISTAT); yearly variation | Employment income, private pensions, fringe benefits |
| Self-employment income index | 102.7 | 109.8 | 114.8 | 102.7 | 102.7 | 102.7 | 2018–2022: average self-employment income from tax returns data (Italian Department of Finance); yearly variation<br>2023: 85% CPI variation, own assumption | Self-employment income |
| Cadastral income index | 102.2 | 102.2 | 102.2 | 102.2 | 102.2 | 102.2 | 2018–2021: FOI index (ISTAT), yearly variation 2022–2023: 0% CPI variation, own assumptions | Imputed cadastral value of the main residence and other buildings |
| Interest rate index | 101.6 | 103.3 | 107.2 | 101.6 | 101.6 | 101.6 | Average interest rate of state bonds (Italian Department of the Treasury); yearly variation | Dividends, interests on deposits, interests on state bonds, interests on other bonds, financial capital |
| Consumer Price Index (CPI) | 102.1 | 110.4 | 116.4 | 102.1 | 102.1 | 102.1 | FOI index (ISTAT); yearly variation | Mortgage payments (interests and capital), refurbishment expenses and related tax credit, rent paid and received according to contract type and tax regime |
| Index for tax-benefit indexation | 100.2 | 102.1 | 110.4 | 100.2 | 102.1 | 102.1 | FOI index (ISTAT); yearly variation of the previous year in accordance to indexation rules | Old-age/seniority pensions (I), survivors' pensions (I), incapacity pensions (I), social pension (S), disability benefits (I), family allowances (S), work-replacement benefits (I), other social transfers (I) |

Note: Base index values are set to 100 in 2018. (I) means that the benefit is included in the model but is taken from input data; (S) indicates that the benefit is simulated by the model. The indexation mechanism for social insurance pensions is fully simulated for each year between 2018 and 2023. The minimum income benefit is also simulated, but it is not included in the above table, as it does not foresee any adjustment to inflation.

# Appendix C Factor adjustment for fiscal drag calculation

In what follows, we briefly illustrate the calculation of the factor adjustment related to fiscal drag through PIT. We must keep in mind that this factor is of negligible relevance in a setting where the baseline is compared to a counterfactual in which the recent changes to pension contribution rates are included among inflation-independent changes. In contrast, it would be more relevant when these changes are inflation-dependent.

We provide an example in which increased relative tax burdens are the result of inflation-related income adjustments and lack of indexation for contribution and tax thresholds. Suppose that gross income for contribution purposes ($Y_{SICs}$) equals 100, adjusts fully to inflation and is entirely made of labor income. As a result, post-inflation income is higher by 10%. Now suppose that the rise in inflation results in a 1-percentage-point increase in the effective contribution rate ($t_{SICs}$). Gross income subject to PIT, which is defined as $Y_{PIT} = Y_{SICs} - Y_{SICs} * t_{SICs}$, is therefore higher in the post-inflation scenario by 8.8%. Finally, suppose that this adjustment leads to a 2-percentage-point increase in the effective PIT rate ($t_{PIT}$).

| | **Pre-inflation scenario (a)** | **Post-inflation scenario (b)** |
|---|---|---|
| $Y_{SICs}$ | 100 | 110 |
| $t_{SICs}$ | 10% | 11% |
| $SICs$ | 10 | 12.1 |
| $Y_{PIT}$ | 90 | 97.9 |
| $t_{PIT}$ | 10% | 12% |
| $PIT$ | 9 | 11.748 |
| $Y$ | 81 | 86.152 |
| $t$ | 19% | 21.68% |

We denote the sum of indexation-induced tax revenue changes such that they equal the indexation-induced tax revenue change that would be obtained by relating total burdens from SICs and PIT to gross income for contribution purposes:

$$\Delta F_{SICs} + \Delta F_{PIT} = Y^b_{SICs} * \left(t^b - t^a\right) \tag{C1}$$

where $t$ is the total liability rate, with superscripts $a$ and $b$ denoting the pre- and post-inflation scenarios, respectively. Recalling the sequentiality in the calculation of SICs and PIT – that is, the calculation of SICs always comes before the calculation of PIT, which means that pension contributions affect gross income subject to PIT – the latter identity holds if and only if $\Delta F_{PIT}$ is reduced by the following factor:

$$\Delta Z = t^a_{PIT} * \left(Y^M_{PIT} - Y^b_{PIT}\right) \tag{C2}$$

where $Y^M_{PIT}$ is the post-inflation PIT gross income that would be obtained if there were no increases in contribution rates following an increase in $Y_{SICs}$. Given our example and Eq. (C1), we have that:

$$\Delta F_{SICs} + \Delta F_{PIT} = \underbrace{Y^b_{SICs} * \left(t^b_{SICs} - t^a_{SICs}\right)}_{\Delta F_{SICs}} + \underbrace{\left[Y^b_{PIT} * \left(t^b_{PIT} - t^a_{PIT}\right) - \underbrace{t^a_{PIT} * \left(Y^M_{PIT} - Y^b_{PIT}\right)}_{\Delta Z}\right]}_{\Delta F_{PIT}} =$$

$$= 110 * (0.11 - 0.10) + [97.9 * (0.12 - 0.10) - 0.10 * (99 - 97.9)] = 2.948$$

$$Y^b_{SICs} * \left(t^b - t^a\right) = 110 * (0.2168 - 0.19) = 2.948 \tag{C3}$$

After rearranging, $\Delta F_{PIT}$ can be expressed as the absolute tax burden resulting from the difference in post-inflation amounts between due liabilities ($L^b$) and liabilities that would be due if there were no relative changes in SICs and PIT ($L^M$). More formally:

$$\Delta F_{PIT} = L^b - L^M = \left(Y^b_{PIT} * t^b_{PIT}\right) - \left(Y^M_{PIT} * t^a_{PIT}\right) \tag{C4}$$

# Appendix D Urban's (2014) decomposition approach

From Lerman and Yitzhaki (1985), we know that the sum of changes in Gini coefficients of post-fiscal income ($Y_d$) as a response to proportional increases in pre-fiscal income ($Y_g$), taxes ($T$) and benefits ($B$) is equal to zero, as expressed in Eq. (D1), where the superscript indicates the variable proportionally incremented.

$$\widehat{G}^{Y_g}_{Y_d} + \widehat{G}^{T}_{Y_d} + \widehat{G}^{B}_{Y_d} = 0 \tag{D1}$$

$$\begin{aligned}
\widehat{G}^{Y_g}_{Y_d} &= \frac{\widehat{\mu}_{Y_g}}{\mu_{Y_d}} \left(C_{Y_g,Y_d} - G_{Y_d}\right) \\
\widehat{G}^{T}_{Y_d} &= \frac{-\widehat{\mu}_{T}}{\mu_{Y_d}} \left(C_{T,Y_d} - G_{Y_d}\right) \\
\widehat{G}^{B}_{Y_d} &= \frac{\widehat{\mu}_{B}}{\mu_{Y_d}} \left(C_{B,Y_d} - G_{Y_d}\right)
\end{aligned} \tag{D2}$$

where $\mu$ stands for the mean; the upper bar indicates that the variable is proportionally incremented; and $C_{a,b}$ is the concentration coefficient of a generic variable $a$ ordered by non-decreasing values of a generic variable $b$.

The property above also holds for the sum of changes in concentration coefficients of $Y_d$ as a response to proportional increases in $Y_g$, $T$ and $B$:

$$\widehat{C}^{Y_g}_{Y_d,Y_g} + \widehat{C}^{T}_{Y_d,Y_g} + \widehat{C}^{B}_{Y_d,Y_g} = 0 \tag{D3}$$

$$\begin{aligned}
\widehat{C}^{Y_g}_{Y_d,Y_g} &= \frac{\widehat{\mu}_{Y_g}}{\mu_{Y_d}} \left(G_{Y_g} - C_{Y_d,Y_g}\right) \\
\widehat{C}^{T}_{Y_d,Y_g} &= \frac{-\widehat{\mu}_{T}}{\mu_{Y_d}} \left(C_{T,Y_g} - C_{Y_d,Y_g}\right) \\
\widehat{C}^{B}_{Y_d,Y_g} &= \frac{\widehat{\mu}_{B}}{\mu_{Y_d}} \left(C_{B,Y_g} - C_{Y_d,Y_g}\right)
\end{aligned} \tag{D4}$$

Finally, recall that:

$$\widehat{G}^{Y_g}_{Y_g} = \widehat{G}^{T}_{Y_g} = \widehat{G}^{B}_{Y_g} = 0 \tag{D5}$$

Following Kakwani (1984), the redistributive effect of a tax-benefit system is given as follows:

$$RE = G_{Y_g} - G_{Y_d} = \underbrace{\left(G_{Y_g} - C_{Y_d,Y_g}\right)}_{VE} - \underbrace{\left(G_{Y_d} - C_{Y_d,Y_g}\right)}_{HE} \tag{D6}$$

where $VE$ and $HE$ are the vertical and horizontal effects, respectively. Recalling that we have defined the set of marginal changes for each coefficient in Eq. (D6), and combining the identities in Eq. (D6) with the identities in Eqs. (D1), (D3) and (D5), we have:

$$\widehat{RE} = -\widehat{G}^{Y_g}_{Y_d} = \widehat{G}^{T}_{Y_d} + \widehat{G}^{B}_{Y_d} \tag{D7}$$

$$\widehat{VE} = -\widehat{C}^{Y_g}_{Y_d,Y_g} = \widehat{C}^{T}_{Y_d,Y_g} + \widehat{C}^{B}_{Y_d,Y_g} \tag{D8}$$

$$\widehat{HE} = \widehat{G}^{Y_g}_{Y_d} - \widehat{C}^{Y_g}_{Y_d,Y_g} = \left(\widehat{C}^{T}_{Y_d,Y_g} - \widehat{G}^{T}_{Y_d}\right) + \left(\widehat{C}^{B}_{Y_d,Y_g} - \widehat{G}^{B}_{Y_d}\right) \tag{D9}$$

where $\widehat{RE}$, $\widehat{VE}$ and $\widehat{HE}$ are the marginal changes in the redistributive, vertical and horizontal effects, respectively.

We now rewrite Eqs. (D7)-(D9) using Eq. sets (D2) and (D4). After substituting, scaling up by the factor $\mu_{Y_d}/\widehat{\mu}_{Y_g}$ and rearranging, we have:

$$C_{Y_g,Y_d} - G_{Y_d} = s_T \left(C_{T,Y_d} - G_{Y_d}\right) + s_B \left(G_{Y_d} - C_{B,Y_d}\right) \tag{D10}$$

$$G_{Y_g} - C_{Y_d,Y_g} = s_T \left(C_{T,Y_g} - C_{Y_d,Y_g}\right) + s_B \left(C_{Y_d,Y_g} - C_{B,Y_g}\right) \tag{D11}$$

$$\begin{aligned}\left(G_{Y_g} - C_{Y_d,Y_g}\right) - \left(C_{Y_g,Y_d} - G_{Y_d}\right) = s_T \left[\left(C_{T,Y_g} - C_{T,Y_d}\right) + \left(G_{Y_d} - C_{Y_d,Y_g}\right)\right] + \\ + s_B \left[\left(C_{B,Y_d} - C_{B,Y_g}\right) + \left(G_{Y_d} - C_{Y_d,Y_g}\right)\right]\end{aligned} \tag{D12}$$

with $s_T = \mu_T/\mu_{Y_g}$ and $s_B = \mu_B/\mu_{Y_g}$. The relative contributions of taxes and benefits are derived by dividing the two terms on the right-hand sides in Eqs. (D10)-(D12) by the left-hand sides.

# Appendix E Alternative scenarios

**Alternative counterfactual scenario**

As an alternative counterfactual scenario, we consider the changes to pension contribution rates for employees as meant to be inflation-dependent policy. In other words, we consider the reduction of contribution rates as a way to cope with the price increases rather than as a measure to reduce the tax wedge on labor income. In this scenario, SIC thresholds are updated to 2023 according to current indexation rules and the dynamics of inflation, but the contribution rates are those in force in 2021 before government intervention, which reduced them to decrease the tax wedge on labor income. This means that the only difference in rules with respect to the counterfactual in Table 2 is related to SIC rates, which are in this case equal to 9.19% up to €48,279 and to 10.19% for income above.

In what follows, we provide the same set of evidence presented in Section 4 for comparability purposes. The net indexation gain raises to 1.22% of GDP in 2023 due to a revenue change in employee SICs amounting to -0.63% of GDP, which in turn leads to increased PIT fiscal drag. In contrast to the evidence presented in Table 4, indexation-induced changes in tax revenue contribute to widening the resources necessary to cope with inflation.

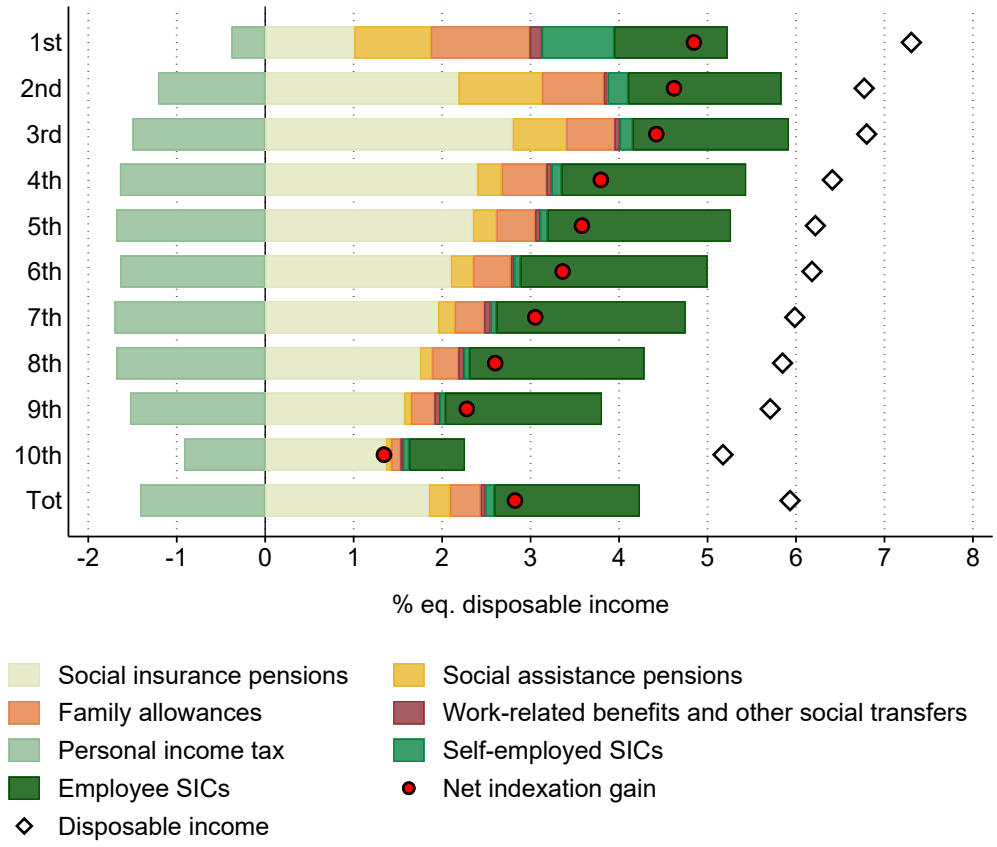
As for the contribution of indexation-induced changes to the redistributive effect, we observe that employee SICs have a marked inequality-reducing effect (1.8%), almost as relevant as social insurance pensions, and that PIT fiscal drag contributes more regressively to income redistribution (-0.5%). Retirees still have an advantage over private sector employees in terms of purchasing power protection, but to a lesser extent: the increase in disposable income between these groups widens by 0.7 percentage points.

**Table E1** Contribution of taxes and benefits to the net indexation gain

| Indexation-induced changes | €(bn) | % GDP | Frequency (No. hh) |
|---|---|---|---|
| Change in taxes ($\Delta F$ or fiscal drag) | -2.166 | -0.10 | – |
| | (-2.380, -1.964) | – | – |
| Employee SICs | -13.200 | -0.63 | 12.695 |
| | (-13.507, -12.929) | – | (12.526, 12.883) |
| Self-employed SICs | -0.823 | -0.04 | 4.853 |
| | (-0.864, -0.789) | – | (4.680, 5.032) |
| Personal income tax | 11.857 | 0.57 | 21.870 |
| | (11.700, 12.056) | – | (21.704, 22.058) |
| Change in benefits ($\Delta B$) | 23.176 | 1.11 | – |
| | (22.920, 23.435) | – | – |
| Social insurance pensions | 18.418 | 0.88 | 10.937 |
| | (18.180, 18.677) | – | (10.806, 11.063) |
| Work-replacement benefits | 0.197 | 0.01 | 0.399 |
| | (0.158, 0.239) | – | (0.347, 0.454) |
| Social assistance pensions | 2.226 | 0.11 | 3.530 |
| | (2.119, 2.324) | – | (3.385, 3.658) |
| Family allowances | 2.122 | 0.10 | 7.956 |
| | (2.084, 2.156) | – | (7.811, 8.085) |
| Other social transfers | 0.213 | 0.01 | 0.764 |
| | (0.175, 0.253) | – | (0.668, 0.851) |
| Net indexation gain ($\Delta B - \Delta F$) | 25.342 | 1.22 | – |
| | (25.037, 25.648) | – | – |
| Change in taxes due to increased tax bases ($\Delta T$) | 16.561 | 0.79 | – |
| | (16.241, 16.980) | – | – |

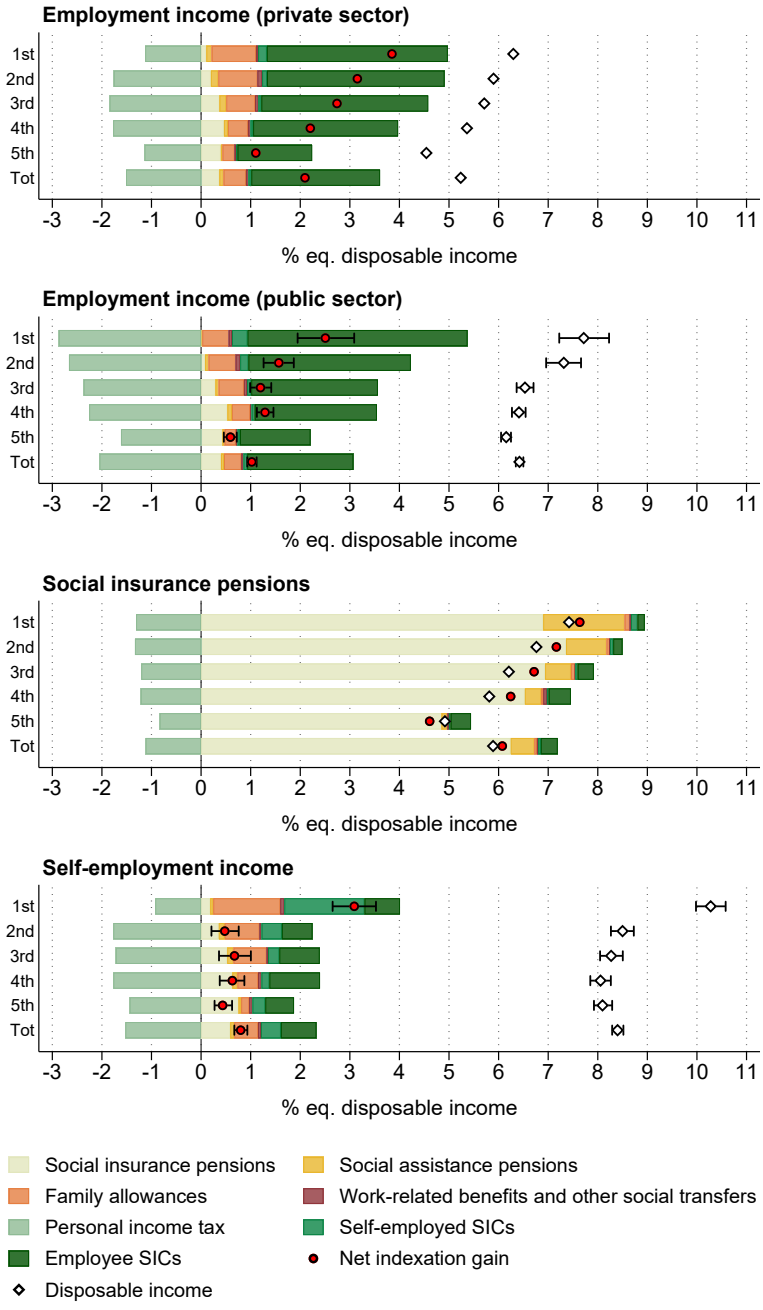
Note: Values in non-equivalized terms. Households in millions. 95% confidence intervals between brackets. $\Delta F$, $\Delta B$ and $\Delta T$ are derived from the comparison of the income distribution resulting from the baseline and the distribution obtained by running a steady-state counterfactual scenario in which no price growth occurs in the 2022–2023 period. In the counterfactual scenario, we consider the reduction in pension contribution rates as an inflation-dependent policy change. Source: Authors' elaborations of EUROMOD outputs.

**Figure E1** Indexation-induced changes and disposable income change by income decile groups



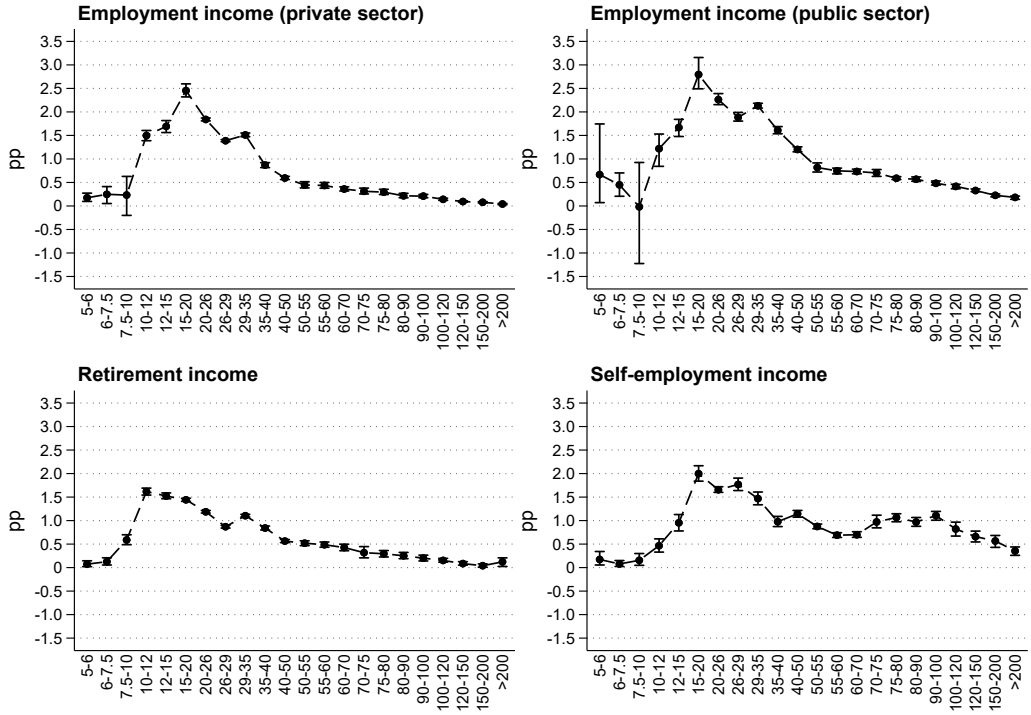

Note: Equivalized disposable income deciles in the baseline on the horizontal axis. Indexation-induced changes and disposable income changes are derived from the comparison of the income distribution resulting from the baseline and the distribution obtained by running a steady-state counterfactual scenario in which no price growth occurs in the 2022–2023 period. In the counterfactual scenario, we consider the reduction in pension contribution rates as an inflation-dependent policy change. Source: Authors' elaborations of EUROMOD outputs.

**Figure E2** Indexation-induced changes and disposable income change by prevalent income source and income quintile groups




Note: Equivalized disposable income quintiles in the baseline on the vertical axis; these are calculated including all individuals, as in Figure 2. Prevalent income is defined at the household level. 95% confidence intervals are reported for net indexation gains and disposable income changes related to the smallest groups only (public sector employees and self-employed) due to their greater variability. Indexation-induced changes and disposable income changes are derived from the comparison of the income distribution resulting from the baseline and the distribution obtained by running a steady-state counterfactual scenario in which no price growth occurs in the 2022–2023 period. In the counterfactual scenario, we consider the reduction in pension contribution rates as an inflation-dependent policy change. Source: Authors' elaborations of EUROMOD outputs.

**Figure E3** Average increase in PIT burden by prevalent income source and income groups




Note: Values in non-equivalized terms. Gross income subject to PIT in the baseline on the horizontal axis in thousands of euros. Prevalent income is defined at the individual level. 95% confidence intervals are reported. To ease comparability with official statistics, the disaggregation by income group follows the same structure as in aggregate data on tax returns provided by the Italian Department of Finance (https://www1.finanze.gov.it/finanze/analisi_stat/public/index.php?tree=2023AAPFTOT020602). Source: Authors' elaborations of EUROMOD outputs.

**Table E2** Contribution of taxes and benefits to income redistribution

| Instruments | $\widetilde{RE}$ Abs. | % | $\widetilde{VE}$ Abs. | % | $\widetilde{HE}$ Abs. | % |
|---|---|---|---|---|---|---|
| Net instruments | | | | | | |
| Net taxes | – | 58.9 | – | 59.5 | – | 61.2 |
| Employee SICs | 0.505 (0.456, 0.552) | 6.8 – | 0.658 (0.608, 0.707) | 6.4 – | 0.154 (0.138, 0.169) | 5.4 – |
| Self-employed SICs | -0.600 (-0.709, -0.494) | -8.0 – | -0.042 (-0.146, 0.060) | -0.4 – | 0.558 (0.520, 0.597) | 19.7 – |
| Personal income tax | 4.165 (3.983, 4.326) | 55.7 – | 4.864 (4.687, 5.021) | 47.2 – | 0.699 (0.666, 0.733) | 24.7 – |
| Proportional taxes | 0.336 (0.289, 0.382) | 4.5 – | 0.375 (0.329, 0.421) | 3.6 – | 0.040 (0.031, 0.047) | 1.4 – |
| Municipal property tax | -0.004 (-0.055, 0.046) | -0.1 – | 0.280 (0.235, 0.325) | 2.7 – | 0.285 (0.256, 0.313) | 10.0 – |
| Net benefits | – | 35.1 | – | 34.9 | – | 33.8 |
| Social assistance pensions | 0.678 (0.610, 0.743) | 9.1 – | 1.187 (1.101, 1.268) | 11.5 – | 0.509 (0.459, 0.556) | 18.0 – |
| Family allowances | 0.967 (0.912, 1.017) | 12.9 – | 1.129 (1.066, 1.186) | 11.0 – | 0.163 (0.137, 0.185) | 5.7 – |
| Other social transfers | 0.048 (0.026, 0.070) | 0.6 – | 0.120 (0.089, 0.151) | 1.2 – | 0.071 (0.040, 0.104) | 2.5 – |
| Minimum income benefit | 0.934 (0.813, 1.035) | 12.5 – | 1.149 (1.010, 1.266) | 11.2 – | 0.215 (0.187, 0.240) | 7.6 – |
| Indexation-induced changes | | | | | | |
| Change in taxes ($\Delta F$ or fiscal drag) | – | 1.7 | – | 1.7 | – | 1.3 |
| Employee SICs | 0.137 (0.123, 0.153) | 1.8 – | 0.164 (0.150, 0.179) | 1.6 – | 0.027 (0.022, 0.031) | 0.9 – |
| Self-employed SICs | 0.031 (0.028, 0.034) | 0.4 – | 0.020 (0.017, 0.023) | 0.2 – | -0.010 (-0.011, -0.010) | -0.4 – |
| Personal income tax | -0.036 (-0.046, -0.026) | -0.5 – | -0.013 (-0.023, -0.003) | -0.1 – | 0.023 (0.019, 0.026) | 0.8 – |
| Change in benefits ($\Delta B$) | – | 4.3 | – | 4.0 | – | 3.6 |
| Social insurance pensions | 0.138 (0.121, 0.156) | 1.9 – | 0.176 (0.158, 0.194) | 1.7 – | 0.037 (0.032, 0.044) | 1.3 – |
| Work-replacement benefits | -0.001 (-0.003, 0) | 0 – | -0.001 (-0.003, 0) | 0 – | 0 (-0.001, 0) | 0 – |
| Social assistance pensions | 0.089 (0.082, 0.096) | 1.2 – | 0.133 (0.125, 0.141) | 1.3 – | 0.044 (0.040, 0.048) | 1.6 – |
| Family allowances | 0.082 (0.076, 0.087) | 1.1 – | 0.095 (0.089, 0.101) | 0.9 – | 0.013 (0.011, 0.015) | 0.5 – |
| Other social transfers | 0.005 (0.003, 0.008) | 0.1 – | 0.012 (0.009, 0.014) | 0.1 – | 0.006 (0.004, 0.009) | 0.2 – |
| Total | 7.474 (7.175, 7.720) | 100.0 – | 10.307 (10.004, 10.550) | 100.0 – | 2.833 (2.703, 2.957) | 100.0 – |

Note: Relative contributions are reported under the column headed with "%". 95% confidence intervals between brackets. Net instruments and indexation-induced changes are derived from the comparison of the income distribution resulting from the baseline and the distribution obtained by running a steady-state counterfactual scenario in which no price growth occurs in the 2022–2023 period. In the counterfactual scenario, we consider the reduction in pension contribution rates as an inflation-dependent policy change. Source: Authors' elaborations of EUROMOD outputs.

**Other alternative scenarios: no indexation and full indexation**

The alternative scenarios presented here share the same macroeconomic assumptions of the baseline. In the case of no indexation of the tax-benefit system, we derive the scenario by disabling benefit indexation from 2022 onward, while holding tax brackets and thresholds constant. In the case of full indexation, we define a scenario in which the entire tax-benefit system is fully adjusted to inflation, according to the backward-looking structure of the current indexation mechanism (see Section 3). Thanks to these alternative scenarios, we estimate the impact of indexation on tax revenue collection and benefit expenditure. In the table below, the "No indexation comparison" and "Full indexation comparison" refer to tax revenue and expenditure changes derived by comparing the baseline to the scenarios with no or full indexation, respectively.

The net sum of resources for individuals induced by indexation ranges from 1.11% of GDP in the "No indexation comparison" to -0.98% of GDP in the "Full indexation scenario". In the former comparison, social insurance pensions contribute most significantly, amounting to 1.17% of GDP. PIT fiscal drag is equal to 0.11% of GDP and primarily reflects the impact of social insurance pensions on the increased PIT burden, as they are the only taxable income component subject to considerable variation across scenarios. On the contrary, PIT plays a dominant role when comparing the baseline to the fully indexed system. The PIT burden increases by 0.64% of GDP due to inflation. This is attributable to the interplay between labor income growth and the indexation rate applied to tax brackets and thresholds, as the latter outpaces the rate applied to employment income. Social insurance pensions are more costly in the fully indexed system due to partial adjustments for better-off retirees in the baseline. However, this does not contribute to fiscal drag as both tax rules and benefit amounts are adjusted for inflation using the same rate. Finally, the minimum income benefit exhibits a reduction equal to -0.11% of GDP as it is the only benefit that is not indexed in the baseline. The peculiar means-testing procedure, which looks at income and wealth from two years prior to the year of benefit receipt, significantly contributes to the magnitude of this change.

**Table E3** Contribution of taxes and benefits to the net indexation gain

| Indexation-induced changes | **No indexation comparison** | | | **Full indexation comparison** | | |
|---|---|---|---|---|---|---|
| | €(bn) | % GDP | Frequency (No. hh) | €(bn) | % GDP | Frequency (No. hh) |
| Change in taxes ($\Delta F$ or fiscal drag) | 4.547 | 0.22 | – | 13.422 | 0.64 | – |
| | (4.449, 4.643) | – | – | (13.253, 13.633) | – | – |
| Employee SICs | 0.304 | 0.01 | 5.293 | 0 | 0 | 0 |
| | (0.263, 0.346) | – | (5.125, 5.475) | – | – | – |
| Self-employed SICs | 1.956 | 0.09 | 4.490 | 0 | 0 | 0 |
| | (1.870, 2.060) | – | (4.318, 4.667) | – | – | – |
| Personal income tax | 2.287 | 0.11 | 19.039 | 13.422 | 0.64 | 21.836 |
| | (2.204, 2.363) | – | (18.850, 19.232) | (13.253, 13.633) | – | (21.672, 22.018) |
| Change in benefits ($\Delta B$) | 29.825 | 1.43 | – | -7.042 | -0.34 | – |
| | (29.468, 30.162) | – | – | (-7.393, -6.699) | – | – |
| Social insurance pensions | 24.364 | 1.17 | 10.937 | -3.959 | -0.19 | 2.703 |
| | (24.042, 24.709) | – | (10.806, 11.063) | (-4.197, -3.698) | – | (2.600, 2.812) |
| Work-replacement benefits | 0.446 | 0.02 | 3.263 | -0.878 | -0.04 | 2.929 |
| | (0.395, 0.499) | – | (3.103, 3.426) | (-0.950, -0.815) | – | (2.776, 3.085) |
| Social assistance pensions | 2.641 | 0.13 | 3.530 | 0.020 | 0.00 | 0.259 |
| | (2.515, 2.758) | – | (3.385, 3.658) | (0.015, 0.026) | – | (0.219, 0.297) |
| Family allowances | 2.122 | 0.10 | 7.956 | 0.160 | 0.01 | 0.727 |
| | (2.084, 2.156) | – | (7.811, 8.085) | (0.136, 0.185) | – | (0.637, 0.815) |
| Other social transfers | 0.252 | 0.01 | 0.764 | 0 | 0 | 0 |
| | (0.207, 0.300) | – | (0.668, 0.851) | – | – | – |
| Minimum income benefit | 0 | 0 | 0 | -2.384 | -0.11 | 2.046 |
| | – | – | – | (-2.653, -2.140) | – | (1.903, 2.172) |
| Net indexation gain ($\Delta B - \Delta F$) | 25.278 | 1.21 | – | -20.464 | -0.98 | – |
| | (24.964, 25.592) | – | – | (-20.866, -20.127) | – | – |
| Change in taxes due to increased tax bases ($\Delta T$) | 4.437 | 0.21 | – | -1.177 | -0.06 | – |
| | (4.338, 4.548) | – | – | (-1.256, -1.090) | – | – |

Note: Values in non-equivalized terms. Households in millions. 95% confidence intervals between brackets. $\Delta F$, $\Delta B$ and $\Delta T$ are derived from the comparison of the income distribution resulting from the baseline and the distribution obtained by running a first counterfactual scenario in which no indexation applies and a second counterfactual in which the tax-benefit system is fully adjusted to inflation. Source: Authors' elaborations of EUROMOD outputs.