# Incentives for voluntary health insurance in a national health system: Evidence from Italy

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## ABSTRACT

*Objectives:* The paper evaluates the extent to which the government's policy to encourage the purchase of voluntary health insurance (VHI) may have led to income-related horizontal inequity in access to health care in a universal health care system (NHS).

*Methods:* Ad hoc tax return data for the universe of Italian taxpayers for years 2009-2016 are used to estimate the tax benefits granted to taxpayers who hold VHI, the redistributive impact, and the public budget effect. The income elasticity of tax benefits is estimated using tax return data and considering some taxpayers' characteristics (income class, gender, age, and geographic area). Standard inequality indices are computed to assess income-related horizontal inequity in access to health care.

*Results:* Tax incentives, especially those granted to employer-paid health insurance, have a sizeable impact on tax revenue and introduce into the Italian NHS significant income-related horizontal and vertical inequity in access to health care. The results suggest a distributional profile of tax incentives that is highly concentrated in favor of wealthier taxpayers.

*Conclusion:* Our analysis adds novel evidence that may contribute to the current debate on whether and to what extent countries in which all citizens have access to free healthcare and equal standards of healthcare services should subsidize VHI, especially when the coverage doubles the healthcare services provided by universal public insurance. We show that VHI reduces tax revenues and introduces disparities among citizens in terms of access to healthcare services.

## 1. Introduction

Although universal healthcare coverage has been largely financed by states in European countries with tax-based national health services (NHS) (i.e., Nordic countries, Southern countries, and the UK), a growing number of individuals are covered by some form of voluntary health insurance (VHI) [1,3,20,26,27]. Most explanations for the increase in VHI focus on the factors related to the demand side of NHS, including long waiting lists, rising co-payments, perceptions of the public system's inadequacy, and changes in individual attitudes about supporting the redistributive role of public healthcare [5,9,18,29,36,39].

Government policies may also have played a significant role in VHI growth in NHS European countries, especially in the initial wave of the insurance market's development [19,21,32,34,40]. With the goal of containing costs, governments have adopted policies to promote the purchase of private insurance, mainly through tax incentives. These policies could have a positive impact in terms of equity, as individuals enrolled in VHI reduce the pressure on the public health care sector by substituting public consumption with private consumption, thereby freeing up resources for the public health care of less well-off citizens [4,38]. The choice to encourage VHI in NHS countries can also be explained by the desire to complement the NHS benefits package. Certain health services, such as dental care, cosmetic and thermal treatments, and alternative medicine, are usually excluded or not fully covered by statutory benefits packages, which increases out-of-pocket expenditure [26]. Thus, policies that promote VHI in NHS countries may reflect the need to ensure the long-term financial sustainability of NHS and to mitigate the burden of out-of-pocket spending [41].

The use of tax incentives is controversial, especially on equity grounds. These incentives may be regressive, as they are usually granted by reducing personal income tax liabilities, which are higher for those with higher incomes [1,12,26,29]. By favouring wealthier individuals over poorer, these incentives may introduce disparities in access to healthcare services [2,8,10,12,15,24]. In ad-

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dition, tax incentives appear to be costly for the public budget, as there is no clear evidence that VHI holders opt out of the NHS and, therefore, that tax incentives are not self-financing [13,23,38].

In Italy, around 2 percent of the population was covered by VHI in 1999, but it increased to 12 percent in 2013 and reached 21 percent in 2017 [33]. Despite its dynamism, the VHI sector still plays a modest role in terms of healthcare funding. The share of current health expenditures financed by VHI rose from 2.2 percent in 2012 (53.1 euros per capita) to 2.6 percent in 2017 (66 euros per capita) [28], and recent estimates suggest that these figures would double in the next decade.

The growing spread of VHI in Italy has been driven mainly by the introduction of VHI into occupational welfare and by tax incentives to individuals and employers who purchase insurance policies for their employees [7,24,34]. Although health care is available to all citizens under the NHS, employer-paid private health insurance is frequently provided as an employee benefit and as an alternative to wage increases [17,31]. Such seems to have been the case for Italy, where wages have seen a long stagnation period, and trade unions often exchanged more occupational welfare, particularly health care coverage, for less remuneration [11,22].

The increasing popularity of VHI in the occupational welfare has been widely supported by Italian government policies through special tax treatments granted to employment-based insurance [24]. The Italian context is similar in many ways to other NHS countries in Europe, but Italy has distinctive features that make it an interesting case to study: the development of VHI seems to have been driven primarily by supply-side policies rather than by factors related to the demand side, and VHI often operates by duplicating the NHS rather than as a complement to it, weakening arguments in favour of public subsidies.

This paper evaluates the extent to which government policies to encourage the purchase of VHI may have led to income-related horizontal inequity in access to health care that is not desirable in a universal health care system like a NHS. The two primary goals of our analysis are to measure the impact of tax policy instruments on the public budget in terms of revenue losses and to determine whether tax incentives introduce income inequality among the insured (by favouring those with higher incomes) and disparities in access to healthcare services among the insured and between the insured and the uninsured. Clarifying these issues can inform policy debate. Although the issue of incentives is central to the Italian debate on the interaction between the public and private health sectors, there is scarce empirical evidence on the impact these incentives have on revenues lost by government or their redistributive effects [24,35,42] .

## 2. Incentives for VHI in the Italian NHS

The Italian NHS is a regionally organized healthcare system founded on the values of universal coverage, equality in access, and solidarity in financing. It guarantees uniform health care across the country based on a national statutory benefits package (the essential levels of care) and is largely free of charge at the point of service. It is financed primarily by national and regional taxes and supplemented by co-payments [14,16,37].

Until the late 1990s, the VHI market in Italy was marginal. Private insurance was principally purchased by high-income, well-educated, healthy people for themselves and their families or by large companies as a benefit for their high-level employees [29]. However, especially after the 2007-2008 economics crisis, Italy's government has progressively limited the growth of its own contributions to health care financing. From 2010 to 2017, public health expenditure as a percentage of GDP decreased from 7 percent in 2010 to 6.5 percent in 2017, and public health expenditure's share of total health expenditures dropped from 78.5 percent in

2010 to 73.9 percent in 2017 [28]. The cost-containment policies adopted by the Government have increased the out-of-pocket payment, which reached 23.5% of total health expenditure in 2017, and the expenditure for VHI.

The expansion of VHI was mainly driven by the Integrated Health Funds (IHFs) introduced in 1992 for financing healthcare services that were supplementary and complementary to the NHS. The IHFs are entities, associations, mutual aid companies, and insurance companies that are regularly registered in the National Register of Funds established by the Ministry of Health in 2008 [25]. To be registered these funds must be managed as non-profit organizations and must accept everyone who demands health insurance without discrimination based on age, health status, medical history, or other individual characteristics.

The National Register of Funds comprises two types of funds, Type-A and Type-B, that provide different healthcare services and enjoy different tax incentives. Type-A funds, which provide individual or group plans to individuals for themselves and their families, have been regulated since 1999 (Law 229/1999) with the aim of complementing and supplementing the NHS benefits package. They cannot offer coverage for health services that the NHS already provides (as they are complementary funds), but they can cover cost-sharing and can offer other services listed by the law (e.g., alternative medical services, thermal treatments and dental services) that supplement those of the NHS. Individuals' contributions to these funds are deductible from Italy's personal income tax (PIT) up to a limit of €3,615.20 per year. The tax provision is granted regardless of the taxpayer's type of income (employment, self-employment, or other income) and the method used to join the fund (i.e., individual or collective).

Type-B Funds (regulated by Law 917/1986) are group insurance schemes offered to employees, mainly as part of the occupational welfare included in collective agreements or employer-specific conditions (employer-based insurance), and may duplicate, complement, or supplement NHS coverage. Since 2010, generous tax relief has been granted to Type-B Funds, provided that at least 20 percent of premium revenue is allocated to health services that are supplementary to the NHS benefits package. Employees' contributions are excluded from PIT and social security contributions (SSC) up to a limit of €3,615.20 per year. The employer's contribution is considered a component of labour cost, but it is charged at a reduced SSC rate.

The presence of higher incentives, along with the possibility of offering services that are also included in the NHS benefits package, have favoured the expansion of Type-B Funds compared to Type-A: in 2017, there were only nine Type-A Funds registered in the National Register of Funds, against 302 Type-B Funds.

Finally, the evaluation of the benefits granted to the taxpayers covered by these funds, should also take into account that the Italian PIT law currently offers tax allowances for eligible out-of-pocket healthcare expenditures to all taxpayers. The most relevant allowance is a tax credit of 19% of expenditures exceeding a lower threshold (129.11 euros). However, taxpayers covered by both HIFs can claim the tax credit only on unreimbursed out-of-pocket health expenditures (due to partial coverage or deductibles).

## 3. Materials and methods

### 3.1. Data

We use *ad hoc* tax return data on the universe of Italian taxpayers for years 2009-2016, as provided by the Ministry of Economics and Finance (MEF). In addition to standard information on taxpayers' gross income, tax deductions, income tax, tax credits, and after-tax income, the MEF provided us with data (not avail-

able to the public) related to the amount of contributions taxpayers and employers paid to Type-A and Type-B funds for which taxpayers claimed a tax relief. According to Italian privacy policy, the MEF provides tax return information only as grouped data so individuals cannot be identified. We organized our dataset of all Italian taxpayers into thirty-two classes of gross income, broken by gender (F, M), age group (0-24, 25-44, 45-64, older than 64), and geographical residence (North-West, North-East, Centre, South, Islands) in each year.

The data indicates that, in 2016, the tax returns of about 13 percent of Italian taxpayers (5.4 million out of 42 million) reported a contribution to IHF and claimed a tax reduction, compared to about 7 percent in 2009. The total amount of contributions follows a less marked trend, from 1,425 million euros in 2009 (5.3% of private health expenditure) to 1,984 million euros in 2016 (5.5% of private health expenditure), with an average annual growth rate of 4.8 percent.

Trends for the two types of funds differ. For Type-A Funds, the number of claimants decreased from about 170.000 in 2009 to 80.000 in 2010, while the average contribution more than doubled in the same period, from €376 in 2009 to €783 in 2016. The overall growth of IHFs was driven primarily by Type-B Funds, as the tax returns of Italian taxpayers that reported a contribution to Type-B Funds and claimed a tax reduction increased from 2,8 to 5,3 million (+88%) and the total contributions increased from 1,361 to 1,921 million euros (+41.1%) in the period considered. Thus, private health coverage played an important and growing role as a work-related benefit. Considering the fall in the average contribution, which dropped from €481 in 2009 to €361 in 2016, the boom of Type B Funds was probably due to an increase in the number of participating companies, with the last comers purchasing less expensive insurance plans with less coverage.

### 3.2. Method

This section describes the procedure used to estimate the tax benefits of taxpayers and companies. Benefits granted to the subscribers of IHF differ depending on whether the IHF is Type-A or Type-B funds.

Regarding Type-A Funds, taxpayers can deduct the amount of the contributions (indicated with $C_i$) from their PIT taxable income up to €3,615.20 per year (including contributions paid on behalf of dependent family members). With respect to a counterfactual scenario without the PIT deduction, the tax relief is defined as the taxpayer's reduction in PIT ($\Delta T_i$), which depends on marginal tax rates of PIT and local income taxes ($t_i$). In Italy, PIT applies a progressive scale based on five income brackets, with marginal tax rates of 23-43 percent and a tax credit for employees that decreases as income rises. These marginal tax rates remained the same over the period considered. Regional tax rates ranged from 1.23 percent to 3.33 percent, and municipal tax rates ranged from 0 to 0.8 percent. Thus, the income tax relief for the $i$-th subscriber of Type-A Funds is: $\Delta T_i^A = t_i C_i$.

Regarding Type-B Funds, we must consider that, in the Italian institutional framework, employer-paid contributions derive from agreements between trade unions and employers' associations and represent an alternative to wage increases. Therefore, we define a counterfactual situation that assumes a situation in which an increase in gross wages takes place instead of the employer-paid contribution to funds. Because of the tax relief granted to Type-B Funds, the alternative increase of gross wages ($\Delta W_i^G$) implies an increase in employees' SSC and PIT. Denoting the employee's SSC rate with $t_E^{ssc}$ (9.19%) and the marginal income tax rate with $t_i$, the tax reliefs for a subscriber to Type-B Funds is: $\Delta T_i^B = (1 - t_E^{ssc}) t_i \Delta W_i^G + t_E^{ssc} \Delta W_i^G$.

As the amount of the health care coverage is the result of an agreement that largely depends on parties' bargaining power, it is not trivial to quantify what would have been the amount of the alternative gross wage increase. For this reason, we design two counterfactual scenarios. In scenario I, we assume that employees receive a gross wage increase ($\Delta W_i^G$) such that their *net wage* increase (net of SSC and income taxes) is equal to the contribution paid by employers to IHFs ($C_i$). Therefore, the assumed gross wage increase is $\Delta W_i^G = \frac{C_i}{(1 - t_E^{ssc})(1 - t_i)}$, as SSC are deductible from taxable income. In counterfactual scenario II, instead, we assume that employees receive a lower wage increase, equal to the contribution paid by employers ($\Delta W_i^G = C_i$). As tax relief depend on the gross wage increase, computed relief in scenario I are greater than in scenario II. We assume that these scenarios represent two extreme cases, so our estimates of tax relief represent the maximum and the minimum of actual figures.

Employers also get advantages by paying Type-B Funds' contributions in favor to their employees instead of according gross wage increases, as those contributions benefit from a reduced employers' SSC rate (10%) instead of the ordinary rate that is on average about 33% ($t_C^{ssc}$). The employers' SSC relief is: $\Delta SSC_i = t_C^{ssc} \Delta W_i^G - 0.1 C_i$, where $\Delta W_i^G$ depends on the scenario adopted.

Then, total relief for Type-B Funds is: $\Delta T_i^B + \Delta SSC_i$.

Finally, to complete the analysis, we should also consider the tax credit of 19% granted to healthcare expenditures in excess of the 129.11 euros threshold. In the base scenario, where only unreimbursed healthcare expenditures ($UNOOP$) qualify for the 19% tax credit, funds' beneficiaries can reduce their PIT liabilities by $0.19(UNOOP_i - 129.11)$. In the counterfactual scenarios the tax credit is granted for the entire amount of healthcare expenditures ($OOP$) and the PIT liability is reduced by $0.19(OOP_i - 129.11)$. The difference in PIT liability between the base and counterfactual scenarios measures the impact of healthcare tax credit on HIFs' tax relief. Therefore, the $i$-th subscriber $\Delta T_i^B$ will be reduced by the 19% tax credit of healthcare expenditures reimbursed.

Due to unavailability of detailed data on beneficiaries' healthcare expenditures and the share of these expenditures reimbursed by funds, we are not able to adequately complement our analysis. However, we can approximate the tax credit at aggregate level by proceeding as follows. We compute the total amount of the healthcare expenditures of beneficiaries by assuming that the amount of healthcare expenditures for each funds' beneficiary is equal to the average amount of taxpayers with the same characteristics (gender, age, geographical residence, income class). This assumption is supported by our data, as we do not find significant econometric evidence of an influence of funds' contributions on the average amount of healthcare expenditures claimed for tax credit. Then, we used Revenue Agency's aggregate information, available only for 2016, to derive the share of healthcare expenditures reimbursed by funds. According to this source in 2016 the Type–A Funds reimbursed 32.9% of healthcare expenses, while the Type–B Funds 29.2% [6].

With this procedure we estimate the effect of healthcare tax credit on the total tax relief for 2016, but because of data limitations we cannot adequately study its effect on tax relief distribution.

### 4. Results

Referring to years 2009 and 2016, Table 1 reports the tax relief obtained by taxpayers in terms of reduction in PIT and SSCs (only for those employees with health insurance coverage through their workplace), and by employers in terms of reduction in SSCs.

Tax relief on Type-A Funds reduced PIT revenue by 24.1 million euros in 2016, whereas the PIT and SCC revenue reduction for

**Table 1**
Tax relief of integrated health funds

**Type-A Funds**

|  | | Tax relief $\Delta T^A$ (000 €) | Average tax relief per claimant (€) | Tax relief/contributions |
|---|---|---|---|---|
| 2009 | | 23,720 | 140.6 | 37.4% |
| 2016 | | 24,121 | 300.7 | 38.4% |

**Type-B Funds**

| | Employees' tax relief $\Delta T^B$ (000 €) | Employers' tax relief $\Delta SSC$ (000 €) | Total tax relief (000 €) | Average employees' tax relief per claimant (€) | Employees' tax relief /contributions |
|---|---|---|---|---|---|
| | | | Scenario I | | |
| 2009 | 1,134,605 | 651,155 | 1,785,760 | 400.9 | 83.3% |
| 2016 | 1,625,080 | 927,732 | 2,552,813 | 305.5 | 84.6% |
| | | | Scenario II | | |
| 2009 | 601,334 | 288,079 | 889,413 | 212.5 | 44.2% |
| 2016 | 853,957 | 407,701 | 1,261,658 | 160.5 | 44.4% |

*Source:* MEF, Department of Finance.
*Note:* * The number of taxpayers does not include dependent family members covered by health funds.

**Table 2**
PIT and SSC relief by taxpayers' characteristics in 2016

| | Type-A Funds | | | Type-B Funds | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Scenario I | | Scenario II | |
| | Distribution of claimants (%) | Average relief (€) | Distribution of relief (%) | Distribution of claimants (%) | Average relief (€) | Distribution of relief (%) | Average relief (€) | Distribution of relief (%) |
| **Gender** | | | | | | | | |
| Female | 31.9 | 244.5 | 25.9 | 45.0 | 230.5 | 33.9 | 124.4 | 34.8 |
| Male | 68.1 | 327.5 | 74.1 | 55.0 | 366.7 | 66.1 | 190.1 | 65.2 |
| **Age** | | | | | | | | |
| 0-24 | 0.2 | 110.2 | 0.1 | 3.6 | 48.7 | 0.6 | 30.7 | 0.7 |
| 25-44 | 11.6 | 171.1 | 6.6 | 47.5 | 208.3 | 32.4 | 113.0 | 33.4 |
| 45-64 | 33.9 | 275.8 | 31.0 | 46.5 | 410.2 | 62.5 | 211.9 | 61.4 |
| ≥65 | 54.4 | 345.0 | 62.3 | 2.4 | 587.3 | 4.5 | 302.1 | 4.4 |
| **Area** | | | | | | | | |
| North-West | 36.1 | 348.3 | 41.8 | 38.0 | 340.3 | 42.3 | 177.7 | 42.0 |
| North-East | 18.5 | 237.4 | 14.6 | 28.6 | 222.2 | 20.8 | 118.4 | 21.1 |
| Centre | 27.2 | 320.1 | 28.9 | 19.9 | 379.0 | 24.7 | 197.9 | 24.5 |
| South | 12.3 | 242.3 | 9.9 | 9.0 | 285.9 | 8.4 | 151.5 | 8.5 |
| Islands | 6.0 | 242.0 | 4.8 | 4.5 | 256.7 | 3.8 | 136.8 | 3.9 |
| **Income class** | | | | | | | | |
| <10,000 | 4.0 | 32.7 | 0.4 | 11.3 | 14.1 | 0.5 | 11.8 | 0.8 |
| 10,000–15,000 | 3.9 | 158.1 | 2.1 | 11.7 | 72.5 | 2.8 | 46.5 | 3.4 |
| 15,000–26,000 | 15.7 | 148.8 | 7.8 | 35.5 | 106.7 | 12.4 | 64.4 | 14.3 |
| 26,000–35,000 | 23.9 | 204.5 | 16.3 | 18.6 | 284.3 | 17.3 | 149.8 | 17.3 |
| 35,000–55,000 | 30.8 | 317.1 | 32.5 | 15.1 | 575.3 | 28.4 | 292.6 | 27.4 |
| 55,000–75,000 | 10.4 | 479.7 | 16.5 | 4.1 | 929.8 | 12.4 | 477.0 | 12.1 |
| >75,000 | 11.3 | 648.4 | 24.5 | 3.7 | 2,154.9 | 26.3 | 1,063.5 | 24.7 |
| **Total** | 100.0 | 300.7 | 100.0 | 100.0 | 305.5 | 100.0 | 160.5 | 100.0 |

*Source:* Authors' calculations using data from MEF, Department of Finance.

Type-B Funds ranged from 2,552 to 1,261 million euros, depending on the scenario considered. In the latter case, about a third of the relief was due to employers' SSC relief. On average, taxpayers received PIT relief of about 38 percent of contributions paid to Type-A Funds, while for Type-B Funds the employees' relief was between 84 percent and 44 percent of the contributions, depending on the scenario considered.

For both types of funds, the tax relief increased 1.7 percent for Type-A Funds and 42-43 percent for Type-B Funds between 2009 and 2016. The increase for Type-A Funds was due to a shift in contributions towards wealthier taxpayers for whom the tax reduction is valued at high marginal tax rates. The increase for Type B Funds was due mainly to the increase in total contributions.

For a complete valuation of the figures in Table 1, we must also consider the effect of the tax credit on healthcare expenditures reimbursed by funds. Following the procedure described in the previous section, we estimate that in 2016 tax credit reduces tax relief by approximately 4.9 million euros for Type-A Funds (-20%) and by 166.6 million euros for Type-B Funds (-6.5% and -13.2% for the

two counterfactual scenarios). The results reveal that its impact on tax relief for HIFs, while not negligible, is relatively modest. This is mainly due to the fact that the health expenditures reimbursed by the funds (26 million euros for Type-A Funds and 877 million euros for Type-B Funds) are only about 30% of the healthcare expenditures potentially qualifying for the healthcare tax credit, equal to approximately 78 million euros for Type-A Funds and 3,002 million euros for Type-B Funds, out of 17,198 million euros for all taxpayers

Excluding companies (and the PIT tax credit for healthcare expenditures), relief granted for IHF contributions reduced taxpayers' tax liability and increased their disposable income, but the contributions' redistributive effects depend heavily on the tax system's design (i.e., the effective marginal tax rates) and on the pre-tax income distribution. Information on the distribution of tax relief based on taxpayers' characteristics and income classes for year 2016 are shown in Table 2.

Overall, average tax relief was higher for men, increased with age, and was higher for taxpayers in Italy's North-West and Centre

regions. The distribution of claimants and relief by gender and age differed substantially between the two types of funds, highlighting the greater gender disparity in Type-A Funds than in Type-B Funds and the greater concentration of older taxpayers in Type-A Funds.

The results also suggest that higher-income taxpayers benefitted more from tax relief than lower-income taxpayers did, so an increase in net income inequality may be expected. For both types of funds, the average tax relief increased with income, with the largest amounts of relief in the top income class. The evidence of a positive income gradient of tax relief reflects the profiles of the average contribution and the effective marginal tax rates, both of which increase with income.

Important information about the distributive profile of tax relief can be obtained by considering the value of the elasticity of relief with respect to income, which indicates the percentage increase in relief that is due to a 1 percent increase in gross income. If relief is equal for all taxpayers, the income elasticity is zero. If, instead, relief grows proportionally with income, the income elasticity equals 1. An income elasticity that is greater than 1 indicates advantages that are more than proportional in favour of the wealthiest people and a regressive effect on income distribution.

To estimate the average income elasticity of tax relief, we considered our database as pooled data—that is, as a time series of cross-sections in which each cell contains information about a group of taxpayers defined by income class, gender, geographical area, and age. We carried out the analysis with reference to the 2014-2016 period, for which detailed data for all cells are available. Overall, our database contains 1,280 cells per year. As each cell contains averages across the group, we used weighted ordinary least squares, with weights equal to the number of taxpayers in each cell. (Summary statistics are reported in Table A.1 in the Appendix.)

A preliminary analysis shows that the average income elasticity of tax relief is 1.869 for Type-A Funds, and 1.911 and 1.801, respectively, for scenarios I and II of Type-B Funds. All elasticities are greater than 1, signalling a strong regressive effect.

To explain how taxpayers' characteristics influence the amount of tax relief, we estimated a regression in which taxpayers' tax benefit depends on their gross income and on a series of dummy variables that identify the taxpayers' characteristics. We also included as regressors the dummy variables that relate to the years and to the interactions between income and characteristics. The reference taxpayer is male, between 45 and 64 years of age, and resident in the Centre of Italy in 2014. The regression model specification allows income coefficients to be interpreted as elasticities.

Estimates are shown in Table 3. The most striking result is that the elasticity of tax relief with respect to gross income is higher than unity (and statistically highly significant) for the reference taxpayer. This elasticity is 1.251 in the case of Type-A Funds and 1.723 and 1.603 for Type-B Funds (scenarios I and II, respectively). These results confirm that the incidence of tax relief on income tends to increase as income grows, especially with regards to Type-B Funds. Therefore, tax relief tends to favour wealthy taxpayers, so its redistributive effect is regressive.

Our estimates confirm the presence of gender differences only for Type-A Funds, as women see lower average tax relief (-2.621) and higher income elasticity than men do because the interaction with income is positive (0.251). Age also has a significant effect on tax benefits, as taxpayers over age 65 have higher income elasticity than the reference group does. Geographic area has a limited effect and only for Type-B Funds, as only in the North-East is the average level of relief significantly higher and the income elasticity significantly lower than that of the reference group.

Additional insight into the distribution effect of tax relief can be gained using concentration curves and indices. (See Table A.2 in the Appendix). The clear regressive profile of tax relief is confirmed

visually by the concentration curves shown in Fig. 1 for year 2016. The Lorenz curve represents the inequality of the distribution of income, indicating, for example, that the poorest 80 percent of the income distribution has about 50 percent of the income. The concentration curve represents the inequality of the distribution of tax relief, so in this case, the poorest 80 percent receives only 13 percent of the tax relief from Type-A Funds and 25-28 percent of the tax relief from Type-B Funds.

The concentration index of tax relief is 0.789 for Type-A Funds and 0.715 and 0.687 for the two scenarios of Type-B Funds, confirming that tax relief is more unequally distributed than income (which has a Gini index of 0.409). People choose Type-A Funds voluntarily, so the corresponding relief for those funds is more concentrated in higher income taxpayers than it is for Type-B Funds, which are provided by employers and more widespread at all income levels. Tax relief for Type B Funds in scenario I is more regressive than it is in scenario II, as in the first scenario relief is computed with higher gross income increases, which imply higher marginal tax rates.

The distributional pattern of tax relief could be affected by the 19% tax credit for healthcare expenditures reimbursed by funds, which it is not included in the analysis. The tax credit ($R$) reduces the tax relief ($\Delta T$) and this may impact the concentration index of tax relief. The concentration index of the difference $\Delta T - R$ is the weighted average of concentration indices $C(\Delta T)$ and $C(R)$, then $C(\Delta T - R) = (1 + \alpha)C(\Delta T) - \alpha C(R)$, where $\alpha$ measures the relative importance of $R$ with respect to $\Delta T - R$. We have shown above that the tax credit for reimbursed healthcare expenditures account only for 10-20% of tax relief, therefore, we expect the effect of tax credit on the concentration index, $C(\Delta T - R)$, to be quite small. Moreover, our data allow us to obtain additional insight because we can compute the concentration index of the tax credit of healthcare expenditures of all taxpayers, which turns out to be 0.39. Hence, if we assume that $C(R) = 0.39$, the concentration index of tax relief becomes 0.89 for Type-A Funds, and 0.75 and 0.76 of Type-B Funds (in the two scenarios). In this case the regressive pattern of tax relief would be strengthened.

## 5. Discussion

The tax incentives for IHF introduced into the Italian NHS some sources of horizontal inequality on citizens' access to healthcare. The first source of horizontal inequality is based on personal characteristics. For example, some taxpayers with strong negotiating skills can get better access to care than others with the same ability to pay can.

In addition, some people are excluded altogether from this kind of tax benefit, such as those who do not work, those who work for companies that do not offer IHF, and those who do not have sufficient income to afford a health insurance policy.

A second source of horizontal inequality is due to higher contributions to funds allowing higher-quality health care [35], while in a country with a NHS the key principle is equality of opportunity for anyone who has the same medical condition. Inequity occurs among IHF beneficiaries, especially for women and older people, who are penalized because their contributions are lower and grow less with income than those of other beneficiaries.

The tax incentives for IHFs also increase vertical inequality, as our results highlight a profile of highly regressive tax relief. The income elasticity is well above unity, so the tax relief appears to be like a strong subsidy granted to a luxury good.

Finally, the use of the tax system as a method of subsidizing private healthcare demands transparency if it is to visualize the costs and benefits of this tax expenditure correctly. Specifically, the current design of VHI benefits in the form of tax exemption or tax deduction of premiums makes evaluating the distributional

**Table 3**
The determinants of taxpayers' tax relief

| Dependent variable: ln *tax relief per taxpayer* | Type-A Funds | | Type-B Funds | | | |
|---|---|---|---|---|---|---|
| | | | Scenario I | | Scenario II | |
| | Coef. | p>\|t\| | Coef. | p>\|t\| | Coef. | p>\|t\| |
| Constant | -13.173 | 0.000*** | -13.422 | 0.000*** | -12.778 | 0.000*** |
| Gross income per taxpayer (lnY) | 1.251 | 0.000*** | 1.723 | 0.000*** | 1.603 | 0.000*** |
| Women | -2.621 | 0.001** | -0.558 | 0.366 | -0.564 | 0.350 |
| North-West | 0.241 | 0.835 | 0.888 | 0.301 | 0.903 | 0.280 |
| North-East | 1.671 | 0.193 | 2.346 | 0.005** | 2.338 | 0.004** |
| South | -1.056 | 0.379 | -1.536 | 0.095 | -1.564 | 0.082 |
| Islands | -1.528 | 0.232 | -0.610 | 0.514 | -0.636 | 0.486 |
| Age 0-24 | -5.911 | 0.008** | 2.559 | 0.000*** | 2.002 | 0.001** |
| Age 25-44 | 0.164 | 0.836 | 0.888 | 0.143 | 0.725 | 0.217 |
| Age ≥65 | -13.235 | 0.000*** | -10.302 | 0.000*** | -10.221 | 0.000*** |
| Year 2015 | -0.186 | 0.048* | 0.101 | 0.207 | 0.100 | 0.203 |
| Year 2016 | -0.503 | 0.000*** | 0.190 | 0.013* | 0.190 | 0.012* |
| *Interaction of* lnY *with:* | | | | | | |
| Women | 0.251 | 0.003** | 0.009 | 0.889 | 0.010 | 0.873 |
| North-West | -0.052 | 0.659 | -0.093 | 0.284 | -0.094 | 0.266 |
| North-East | -0.192 | 0.133 | -0.254 | 0.003** | -0.252 | 0.002** |
| South | 0.071 | 0.555 | 0.073 | 0.439 | 0.076 | 0.409 |
| Islands | 0.086 | 0.506 | -0.010 | 0.914 | -0.007 | 0.938 |
| Age 0-24 | 0.378 | 0.122 | -0.267 | 0.000*** | -0.207 | 0.002** |
| Age 25-44 | -0.115 | 0.156 | -0.054 | 0.394 | -0.036 | 0.549 |
| Age ≥65 | 1.344 | 0.000*** | 0.714 | 0.000*** | 0.707 | 0.000*** |
| N. of observations (†) | 754 | | 922 | | 922 | |
| F-statistic | 148.677 | | 379.863 | | 371.325 | |
| Degrees of freedom | 19 | | 19 | | 19 | |
| R-squared | 0.824 | | 0.931 | | 0.93 | |
| Adjusted R-squared | 0.819 | | 0.929 | | 0.929 | |
| Root_MSE | 0.776 | | 0.67 | | 0.655 | |

*Legend:* * p<0.05; ** p<0.01; (†) Number of observations with non-null tax relief.
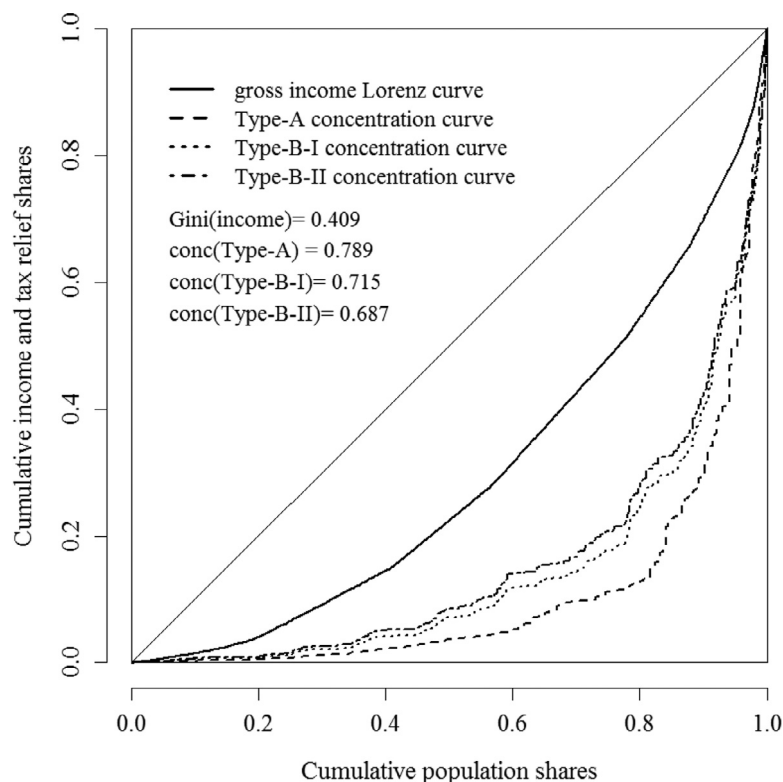*Notes:* Weighted OLS regression, weights: number of taxpayers.



**Fig. 1.** Concentration curves of tax relief (2016)

and revenue impacts of tax relief difficult. To improve the transparency and mitigate the regressive nature of the benefits, benefits could be transformed from a PIT exemption to a tax credit that is clearly visible in tax returns. As an example, we simulated a tax credit of 19 percent of contributions (the rate granted for Italy's PIT for out-of-pocket healthcare expenditures) with an upper threshold of €3,615.20 of contributions per year. Compared to the current situation, this policy would have reduced the concentration indices from 0.789 in 2016 to 0.691 for Type-A funds, and from 0.715 (0.687) to 0.695 (0.564) for scenario I (scenario II) for Type-B funds. The tax credit scheme would lead to a marked reduction in the total tax benefit of 62 percent for Type-A funds and 35 percent and 67 percent for Type-B funds for scenarios I and II, respectively.

The opportunity to have access to better healthcare than that provided by the NHS by means of private insurance or expenditures is of value, but we stress the inequity that arises when the State decides to encourage private insurance or expenditures through tax benefits. Moreover, tax relief that is granted to someone is a loss of revenue for the State, so whether the same amount of money could be used to improve the NHS's level of healthcare deserves assessment.

## 6. Conclusion

The results of our analysis add novel evidence that may contribute to the debate on whether countries in which all citizens have access to free healthcare and equal standards of healthcare services should subsidize a VHI that doubles the coverage provided by universal public insurance [23,27].

The development of VHI in Italy was driven mainly by IHF provided through collective agreements and/or employers' unilateral decisions (Type-B Funds). In Italy's social context, tax relief granted to IHFs owes its success to their being a powerful instrument of labour policy and often welcome as a "win-win solution," as they reduce both employees' PIT and employers' labour cost. The high tax relief granted to employees and employers favored the solution of pay disputes, as private health coverage was used in substitution of wage increases [30].

The present study shows that tax relief granted to IHFs has led to significant inequality, as it gives tax advantages to workers and companies at the expense of other taxpayers and favours wealthy policyholders over poor ones. Although IHFs are an increasingly important component of Italy's health system, their impact on the demand for health services, on the NHS structure, and on the health of citizens has not yet been well defined, nor has the essential issue of inequality of access to healthcare.

## Declaration of Competing Interest

None.

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## Appendix

**Table A.1**
Descriptive Statistics of variable used in the regressions

**Type-A Funds dataset**

Number of observations (with tax relief>0): 754

Number of taxpayers (sum of weights) 2014-2016: 101,194,561

| Description | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|
| Average tax relief per taxpayer (€) | 0.7406 | 2.5396 | 0.0002 | 40.3634 |
| Average gross income per taxpayer (€) | 21,709 | 19,992 | 2,328 | 144,817 |
| Women | 0.4796 | 0.4996 | 0 | 1 |
| NW | 0.2890 | 0.4533 | 0 | 1 |
| NE | 0.2204 | 0.4145 | 0 | 1 |
| Centre | 0.2058 | 0.4043 | 0 | 1 |
| South | 0.1980 | 0.3985 | 0 | 1 |
| Islands | 0.0868 | 0.2815 | 0 | 1 |
| Age 0-24 | 0.0182 | 0.1336 | 0 | 1 |
| Age 25-44 | 0.2795 | 0.4488 | 0 | 1 |
| Age 45-64 | 0.3260 | 0.4688 | 0 | 1 |
| Age ≥65 | 0.3763 | 0.4845 | 0 | 1 |
| Year 2014 | 0.3322 | 0.4710 | 0 | 1 |
| Year 2015 | 0.3350 | 0.4720 | 0 | 1 |
| Year 2016 | 0.3328 | 0.4712 | 0 | 1 |

**Type-B Funds dataset**

Number of observations (with tax relief>0): 922

Number of taxpayers (sum of weights) 2014-2016: 104,160,742

| Description | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|
| Average tax relief per taxpayer –scenario I (€) | 45.8888 | 125.5089 | 0.0099 | 1274.7940 |
| Average tax relief per taxpayer – scenario II (€) | 24.0857 | 62.5300 | 0.0067 | 629.2228 |
| Average gross income per taxpayer (€) | 21,263 | 19,393 | 2,202 | 488,442 |
| Women | 0.4809 | 0.4996 | 0 | 1 |
| NW | 0.2864 | 0.4521 | 0 | 1 |
| NE | 0.2161 | 0.4116 | 0 | 1 |
| Centre | 0.2021 | 0.4016 | 0 | 1 |
| South | 0.2009 | 0.4007 | 0 | 1 |
| Islands | 0.0945 | 0.2925 | 0 | 1 |
| Age 0-24 | 0.0397 | 0.1954 | 0 | 1 |
| Age 25-44 | 0.2728 | 0.4454 | 0 | 1 |
| Age 45-64 | 0.3167 | 0.4652 | 0 | 1 |
| Age ≥65 | 0.3707 | 0.4830 | 0 | 1 |
| Year 2014 | 0.3309 | 0.4706 | 0 | 1 |
| Year 2015 | 0.3339 | 0.4716 | 0 | 1 |
| Year 2016 | 0.3351 | 0.4720 | 0 | 1 |

Note: *data weighted with the number of taxpayers.*

**Table A.2**
Inequality and progressivity indices of tax relief $(\Delta T)$

| Gini index of gross income G(Y) | | | |
|---|---|---|---|
| 2014 | 0.409 | | |
| 2015 | 0.412 | | |
| 2016 | 0.409 | | |

| | Type-A Funds | Type-B Funds | |
|---|---|---|---|
| | | Scenario I | Scenario II |

| Inequality: Concentration index of tax relief $C(\Delta T)$ | | | |
|---|---|---|---|
| 2014 | 0.702 | 0.734 | 0.708 |
| 2015 | 0.792 | 0.729 | 0.703 |
| 2016 | 0.789 | 0.715 | 0.687 |

| Progressivity: Kakwani index $K = C(\Delta T) - G(Y)$ | | | |
|---|---|---|---|
| 2014 | 0.293 | 0.325 | 0.299 |
| 2015 | 0.379 | 0.317 | 0.290 |
| 2016 | 0.380 | 0.306 | 0.278 |

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