Healthcare tax credits: financial help to taxpayers or support to higher income and better educated patients? Evidence from Italy

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Abstract

In several countries, taxpayers are given the option to detract from gross taxation a share of their out of pocket healthcare expenditure. The paper investigates the use of Healthcare Tax Credits (HTCs) in Italy through the analysis of a panel data which provides information on individual income tax from 2008 to 2014. The study focuses on the disparities emerging in the use of HTCs between Northern and Southern regions: per capita HTCs, either weighted for general population or for the number of claimants, are higher in the North than in the South of Italy. The existing differences in the average income between the two regional clusters may drive to inequalities in the out of pocket expenditure for healthcare services; however, the observed North-South gradient could also reveal possible disparities in the ability of using HTCs, mainly due to socioeconomic factors. A fixed effects OLS model is run to examine the impact of selected socioeconomic variables on regional per capita HTCs, with a particular focus on the role of education. Results corroborate the regressive imprinting of HTCs supported by literature and provide highlights on the role of education in explaining HTCs distribution among regions. Public money is reimbursed to regions where people are on average richer and better educated. More equitable objectives could be reached by allocating the same resources in the provision of services covered by NHS.

Keywords: Health-related tax credits, regional disparities, healthcare access, income distribution, education

JEL Classification: I14; H31; H51
1. Introduction

In several western countries, taxpayers are given the option to detract from gross taxation a share of their out of pocket healthcare expenditure. This opportunity stems from an equity principle, which is ensuring healthcare access to everyone, regardless of personal resource availability (Culyer 2001; Oliver & Mossialos, 2004; Marmot et al., 2008).

However, the use of healthcare tax credits (HTCs) is highly debated by national and international literature, due to its controversial effects on income distribution. Especially for countries providing universal healthcare coverage, the patient’s choice of consuming private services is strictly related to individual income. National Health Care Systems encompassing both private and public providers generally present longer waiting times with reference to the public services’ access: a patient will presumably choose the private access instead of getting a service for free if he needs a faster admission. Considering these premises, evidence suggests that only patients with middle to high income or a very inelastic demand for health services (e.g. oncology patients) will choose to pay out of pocket (OOP) in the presence of both public and private supply (Getzen, 2000; Van Doorslaer et al., 2006; Marmot, 2007). To this extent, HTCs can be viewed as a tool which is mostly regressive, because it is prominently used by people with higher disposable income (Sheils & Hogan, 1999; Toder et. al, 2016).

With reference to the Italian case, some contributions show that HTCs tend to favor the richest part of the population (Barbetta et al., 2013; Di Novi, et al., 2017). The Italian NHS is a Beveridge oriented System where access to care is free of charge or subject to a copayment, but patients can also choose to consume private services and pay the full cost. HTCs are claimed for both kinds of OOP payments, i.e. private services consumption and copayment, but do not apply for the premiums paid for private healthcare insurance. Since the share of copayment represents only 9% of the whole OOP expenditure (HFA, 2016), HTCs are mainly claimed for the consumption of private services.

Looking at the distribution of HTCs among the Italian regions, a North-South gradient is apparent. Per capita HTCs, either weighted for general population or for the number of claimants, are higher in the North than in the South of Italy and the same unequal distribution can be observed for per capita values of OOP (see Figures 2-4). Differences in the average income at the macro-region level may drive to an unequal use of private health care services. Specifically, the average amount of healthcare expenses for which taxpayers claim a credit increases by classes of reported income.

See also the appendix for regional distribution of HTCs.
Actually, tax credits are partly lost by taxpayers in the bottom income class, due to their low level of taxable income and to the non-refundable nature of these tax credits; in adjunction, the lack of an upper bound to the tax credit tends to favor taxpayers in the top income class (Di Novi et al., 2016). These reasons suggest that the determinants of per capita HTC’s among regions relate mainly to socioeconomic factors. Together with disposable income, there are other socioeconomic variables, such as education, which may play a role in explaining the disparities in the use of HTC’s between Northern and Southern regions. Claiming HTC’s is not an easy task, because they are acknowledged only if the claimer provides the Revenue Agency with the receipt attesting the service’s payment: for people pertaining to low socioeconomic classes, it could be troublesome to collect and store all the receipts, summing up the total amount of expenses and correctly reporting it into the tax return form (Smart & Stabile, 2005). The North-South gradient in terms of HTC’s may therefore be due not only to a higher per capita income and OOP expenditure by the northern population, but also to a more efficient use of this tool. This paper investigates the impact of selected socioeconomic variables on regional per capita HTC’s, with a specific focus on the role of education. The effect of education seems to be uninvestigated by the extant literature and this paper tries to fill this gap.

A regional panel data from 2008 to 2014 is used. Data is drawn from two main sources: the Ministry of Economics and Finance website, where regional information on individual income tax (IRPEF) is reported, and the “Health For All” database, which contains rather detailed information about demographic, socioeconomic and healthcare access characteristics at regional level. A third source from the Ministry of Health (NSIS - Nuovo Sistema Informativo Sanitario) was used to access data on copayment. In order to account for time invariant characteristics at the regional level, the empirical model has been estimated using a fixed effects approach.

Results corroborate previous evidence on the regressive imprinting of HTC’s and provide new highlights for the analysis of this fiscal tool. Income is positively correlated to HTC’s, whereas a variable chosen as a proxy of low education impacts negatively on their use. Richer people, as expected, detract more healthcare expenses; furthermore, people with very low education claim less HTC’s. From a policy perspective, public money is reimbursed to regions where people are on average richer and better educated. The question to be discussed is if this amount of money could be specifically targeted to low income families in order to facilitate their access to healthcare services. More equitable objectives could also be reached by allocating the same resources in the provision of services covered by NHS.

The paper is structured as follows. Section 2 introduces the issue of tax credits, their theoretical aspects and their use in Italy; Section 3 provides an overlook of the Italian NHS; data and model are examined in Section 4; Section 5 and Section 6 address, respectively, discussion and conclusions.
2. Tax credits in Italy: theoretical foundation and practical aspects

In Italy, there are different typologies of personal exemptions (or tax credits) and deductions. While the latter reduce the amount of gross income to be taxed, the former reduce the quantity of tax to be paid. In both cases, they represent a reduction for the governmental fiscal revenue (Revenue Agency, 2016).

According to the welfare theory, tax credits (TCs) are implemented to reduce the fiscal load of individuals that consume either merit goods (such as health or education) or goods whose improvement would generate positive externalities (such as green energy’s commodities). The State acknowledges an individual’s right (access to health or education) or supports a choice that increases the community welfare (Friedman, 1962; Burman, 2003; Batchelder et. al. 2006). From the government standpoint, TCs represent a financial cost, or less availability of public resources, since claimants pay less taxes (Savedoff, 2004).

The economic principle supporting healthcare tax credits aims at decreasing the cost of health access for people who are in need of care. Most evidence relates to the USA Health Care System and analyses federal fiscal policies implemented in order to help low income persons acquire health insurance (Sheils & Hogan, 1999; Pauly & Herring, 2001; Sheils & Randall, 2004). However, with reference to countries with universal health coverage, results are more controversial: for the Italian case, a recent work of Di Novi et al. (2017) suggests that HTCs tend to favor the richest part of the population and the same conclusions are addressed by Barbetta et al. (2013). Similar concerns are expressed by Smart & Stabile (2005) in a paper referred to the Canadian Health System. The present work focuses on the Italian NHS and provides further evidence on the possible unequal effects due to the use of HTCs within public Health Care Systems.

The tax credits system in Italy is rather heterogeneous, in terms of services included and degree of expenses’ coverage. Healthcare costs, together with house mortgages, insurance premiums, private education expenses and many others, can be partially detracted from gross taxation in the measure of 19%. Comparing all these items, healthcare costs for which taxpayers claim a credit represent the largest portion, with a value of 15,972 million euro and a percentage of 59% over the whole amount of expenditures benefiting from TCs (see Figure 1, year 2014). The amount of HTCs in 2014 was...
2,620 million euros\(^2\). Given a taxable income of 817,252 million euro, HTCs represents 0.3% of it (Ministry of Economics and Finance, 2016).

**Figure 1**: Different kinds of expenditures subject to tax credits - percentage value - year 2014

![Bar chart showing different kinds of expenditures subject to tax credits](image)

**Source**: elaboration of data from the Ministry of Economics and Finance, 2016

In Italy access to care is free, except for a copayment applied to many goods and services, but patients can also choose the private supply of services and pay the full cost. Out of pocket expenditure gives patients the right to a tax credit equivalent to 19% of the amount spent over €129.11 (Revenue Agency, 2016). During the fiscal year, each taxpayer should keep all the receipts (pharmaceuticals, medical examinations, diagnostic tests, and others) in order to certify his OOP payment for healthcare services. Of course, the higher the individual fiscal load, the higher the incentive to pay out of pocket in order to reduce the amount of taxes, the higher the inducement to buy private, rather than public, services. Actually, copayment represents only 9% of the whole out of pocket health expenditure, which means that the public money reimbursed to individuals in order to alleviate the economic burden of healthcare access is ultimately and mostly used to remunerate the private supply of care.

\(^2\) Healthcare expenditure can be deducted only for the amounts overwhelming the threshold of 129,11 euros
Evidence shows a heterogeneous pattern in the use of HTC among Italian regions, with a clear North-South Gradient. Figure 2 reports, for the years 2008 to 2014, the HTCs’ per capita value referred to the three different Italian geographical areas, respectively North, Centre and South. Per capita values are represented by the ratio between the annual volume of HTCs and population residing in each macro region (North, Centre, South). The tax credits are claimed for OOP costs incurred by the taxpayer himself and his dependent family members, while expenses for private insurance premiums are not covered by this fiscal grant.

Over the time span considered, it is possible to observe higher (on average 2.4 times greater) values for Northern regions compared to Southern regions, while the values reported for Central regions lie in between the two. To further investigate these differences, a parameter more sensitive to the ability of using HTCs at territorial level was created. This is HTCs weighted for number of claimants: its trend is depicted in figure 3. Here, the North- South gradient is still present, although reduced in magnitude due to the relatively higher number of people claiming HTCs in the North and Centre of Italy with respect to the South of Italy. Central and Northern regions show almost the same values whilst the yearly values for people residing in the South of Italy are on average 37% smaller. Individuals living in the North of Italy averagely retain on gross taxation 50 euros more for healthcare expenditure with respect to people residing in Southern regions.

Figure 2: Trend of per capita HTCs – Regional clusters*: years 2008-2014 – values in euros

<table>
<thead>
<tr>
<th>Year</th>
<th>North</th>
<th>Centre</th>
<th>South</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>42,12</td>
<td>37,06</td>
<td>17,27</td>
</tr>
<tr>
<td>2009</td>
<td>44,22</td>
<td>38,93</td>
<td>18,45</td>
</tr>
<tr>
<td>2010</td>
<td>47,17</td>
<td>41,50</td>
<td>19,98</td>
</tr>
<tr>
<td>2011</td>
<td>50,27</td>
<td>43,99</td>
<td>21,62</td>
</tr>
<tr>
<td>2012</td>
<td>53,70</td>
<td>47,08</td>
<td>22,96</td>
</tr>
<tr>
<td>2013</td>
<td>54,58</td>
<td>47,13</td>
<td>23,33</td>
</tr>
<tr>
<td>2014</td>
<td>55,70</td>
<td>47,55</td>
<td>23,80</td>
</tr>
</tbody>
</table>


3 Liguria, Lombardy, Piedmont, Aosta Valley, Emilia-Romagna, Friuli-Venezia Giulia, Trentin South Tyrol and Veneto are Northern Regions; Lazio, Marche, Tuscany and Umbria belong to the Centre of Italy; Abruzzo, Basilicata, Calabria, Campania, Molise, Apulia, Sardinia and Sicily are Southern regions.

4 This variable is interesting because it explains the difficulties of using HTCs among taxpayers. In fact only a share of people subject to the personal income tax (IRPEF) makes use of HTCs and this share follows a North South gradient. In the time-span observed, the share is 46% in the North of Italy, 43% in the Centre and only 34% in the South of Italy.
*North = Liguria, Lombardy, Piedmont, Aosta Valley, Emilia-Romagna, Friuli-Venezia Giulia, Trentino South Tyrole, Veneto; Centre = Lazio, Marche, Tuscany, Umbria; South = Abruzzo, Basilicata, Calabria, Campania, Molise, Apulia, Sardinia, Sicily.

**Figure 3:** Trend of HTCs weighted by the number of claimants – Regional clusters*: years 2008-2014 – values in euros

![Graph](image1.png)

**Source:** elaboration of data from the Ministry of Economics and Finance, 2016

**Figure 4:** Trend in OOP per capita expenditure–Regional clusters: years 2008-2014 – values in euro

![Graph](image2.png)

**Source:** elaboration of data from HFA, 2016

Since HTCs represent a share of OOP expenditure, the trend of the latter, weighted for the local population, was examined too. Data on OOP was drawn from the database “Health for All” and a variable representing the ratio between total OOP and the population of each regional cluster was
created. Figure 4 shows the 2008-2014 trend: although this variable is rather simplistic, because it is not weighed for population age, the gap between Northern and Southern population is apparent, confirming that on average the former spends on private healthcare access 200 euros more per resident compared to the latter. This difference, although fluctuating, is confirmed during the whole time-span. Given the strict correlation between OOP expenditure and disposable income (Van Doorslaer et al, 2006), it can be reasonably acknowledged that patients residing in the North or Centre of Italy, which on average have more disposable income, spend more on private healthcare access and make more use of HTCs.

3. The Italian NHS - a brief overview

The Italian NHS was founded in 1978, on the basis of the UK Beveridgian NHS. Its main characteristics are free access to care, universality of coverage, public financing, patient’s free choice, separation between the provision and the financing of healthcare services, competition between providers of care and decentralization. Several of these features were reached through different reforms that took place over time with the twofold objective of preserving equity of access and controlling the public healthcare expenditure, while maintaining the quality of services. According to a chronological criterion, the first decade after the implementation of the Italian NHS, which replaced a pre-existing Social Security System, is prominently dedicated towards extending the universality of coverage through the whole territory and among different social classes. In the nineties, due to a problem of high healthcare expenditure, managerialism and competition were introduced into the healthcare sector. Public hospitals were reformed and transformed into public firms and quasi market principles were promoted, favoring competition among public providers and between public and private providers (France et al., 2005; Brenna, 2011). To favor these changes new tools were introduced into the system: DRGs, which were implemented as a method of perspective payment for hospital admissions, gave more transparency and efficiency to hospital activity, while a copayment was applied to several health services in order to control for moral hazard behaviors.

Starting from the 2000, a new process of devolution and regionalization has characterized the Italian NHS, which is now composed of 20 regional healthcare systems. Regions are responsible for the financing and organization of their health care systems, although the central government still plays a main role in warranting equity principles and governing the healthcare expenditure. Patients can move from one region to another to get healthcare services and the region where they live
should pay the price of the healthcare access to the region where the service has been provided. The patients’ migration phenomenon, which follows a South-North direction and moves each year a consistent flow of patients, reveals regional disparities in the supply of services and in the ability to satisfy the internal needs of care by each regional system (Brenna & Spandonaro, 2016).

With reference to the most recent years, the increase of public health expenditure has finally been governed. This is due both to a rigorous observance of regional budget constraints, which became more stringent after the economic crisis, and to a rigid monitoring of the expenses for those regions showing prolonged deficits. As a consequence, an increase in the private expenditure has been observed. From 2010 to 2014 the OOP per capita expenditure has risen by 8%, from €512 to €553 Euro, while the per capita public expenditure experienced a nominal decrease of almost 2%, from €1,861 to €1,819 (HFA, 2016).

### 4. Data and model

#### 4.1. Datasets and variables

The model explains the per capita value of HTCs (i.e. the regional total amount of HTCs weighted by regional population) by regressors related to three groups of variables, specifically variables addressing the socioeconomic status of regional population, variables controlling for the regional supply of health care services, and a group of selected demographic and health-related variables chosen as proxies for a higher demand of healthcare services.

Three data sources were used, respectively the Ministry of Economics and Finance website, the “Health for All” (HFA) database and a source from the Ministry of Health which provides data on copayment. Further details on these datasets are given below.

Data is provided on a regional basis and spans over 7 years, from 2008 to 2014, for each of the 20 Italian regions, such that the panel includes 140 observations.

As a preliminary approach, a number of fiscal and economic variables which may explain the HTCs were examined in order to test for possible model specifications. The source of fiscal data is represented by the Ministry of Economics and Finance website, which provides detailed information on IRPEF, the personal tax applied to different kinds of income (employment and self-employment, real estate, capital gains, corporate income and other incomes). Exemption area is determined by yearly incomes below 8,000 euros (7,500 for pensioners younger than 75 and 7,750 for pensioners aged 75 and over). This suggests that HTCs are partly lost by taxpayers in the bottom
income class, due to their low level of taxable income and to the non-refundable nature of these tax credits.

Data drawn from the Ministry of Economics and Finance website includes, the total yearly *amount of OOP expenses for which taxpayers have claimed a credit (at regional basis)*, the *regional number of taxpayers*, the *total amount of taxable income* and the *regional number of claimants HTCs*. For each of the mentioned variables it was possible to further disaggregate the data into categories of taxpayers (pensioners, employed, self-employed, and so on). This option was subsequently employed in the robustness check, when a separate model on pensioners, whose fiscal behavior is easily controlled for, was run. New variables were also created from the variables listed above, for a possible inclusion among the regressors; specifically, the *share of claimants over taxpayers*, the *per capita value of HTCs weighted by the number of claimants*, and the *per capita taxable income*. The natural logarithm of the financial values was also created for a possible log specification. The dependent variable is represented by the *regional per capita amount of HTCs*.

The Ministry of Economic and Finance website provides each year the total amount of OOP expenses for which taxpayers have claimed a tax credit (labeled OOP_exp). The first step to calculate the dependent variable consists in detracting from this amount the initial deductible of 129.11 euros multiplied by the number of claimants (N_cl). The net result is then multiplied by 0.19, which is the applied percentage, and finally weighted by the regional population (pop), such that:

\[
htc_{pc} = \frac{[OOP\_exp - (N\_cl \times 129.11)] \times 0.19}{pop}
\]

Data on healthcare access, healthcare expenditure, socioeconomic status and demography is derived from the HFA database, a comprehensive dataset covering 53 countries in the WHO European Region. Data for Italy is provided on a regional level.

For preliminary estimates, the following variables were selected and examined: the *total amount of out of pocket expenditure*, which includes all the expenses incurred by families for both the private and public access to health services, i.e. private services consumption plus the share of copayment for the NHS services. OOP is a multiplier of the dependent variable and for this reason was not included among regressors: in fact, it would capture all the variability of per-capita HTCs, without letting the other regressors reveal their impact. Instead, the *percentage of public expenditure over the whole healthcare expenditure* was included among regressors with the aim of controlling for regional differences in the use of public services. A limit of the present work is represented by the
absence of variables explaining the supply of private healthcare services at the regional basis. In the presence of supplier induced demand, which is a very common phenomenon within the healthcare sector, a higher concentration of private services can explain a higher use of them. The percentage of public expenditure could be considered a proxy of the use of public, rather than private, services; for this reason, it is expected to impact negatively on the per capita HTCs. Another variable implied as a control for the use of healthcare services at the regional basis is the total number of community care services, such as daily clinical services, mental health services, elderly and disabled services. The idea is that a higher presence of these infrastructures would facilitate a higher demand of both public and private healthcare access, due to a higher number of prescriptions. Moreover, since this variable encompasses elderly residential buildings, that generally require non-negligible copayment costs, it could capture a higher share of copayment for regions with a higher concentration of this kind of services. Unfortunately, the last two variables are provided only for years 2008 to 2013, and consequently the number of observations for the chosen specification is reduced to 120 (see Table 1).

With regard to the socioeconomic status of regional populations, the variables selected are the following: the regional rate of unemployment, the percentage of households living in poverty, the share of population with no education or at most the primary school degree, the share of population with at most the lower secondary school degree (up to age 14). While the two former variables relate to possible variations in the healthcare access due to lower socioeconomic status (Van Doorslaer et al., 2006; Marmot 2007; Marmot et al., 2008), the variables addressing education were specifically selected in order to examine the effect of a lower education on the capacity of claiming HTCs.

Demographic and health conditions’ variables, that were chosen as proxies for a higher demand of healthcare services, are the elderly (65+) share of population (Caroli et. al, 2016) and the percentage of smokers (European Commission, 2004; Mc. Gorrian et al., 2011). The regional number of residency permits was also included to control for possible differences in access to care due to the number of regular migrants (Baglio et al., 2010; Devillanova, 2012).

The monetary variables were all weighted for population, in order to obtain per capita values which could be compared among regions. The variables employed in the final specification and their description are reported in Table 1.
### Table 1: Variables employed in the model

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>Source</th>
<th>Available years</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>htc-pc (dependent vb)</em></td>
<td>Per capita value* of regional HTCs</td>
<td>Elaboration of data on personal taxation (IRPEF) drawn by the Ministry of Economics and Finance</td>
<td>2008 to 2014</td>
</tr>
<tr>
<td>inc-pc</td>
<td>Per capita value of regional income</td>
<td>Ministry of Economics and Finance</td>
<td>2008 to 2014</td>
</tr>
<tr>
<td>prim</td>
<td>Percentage of population with no education or at most the primary school degree **</td>
<td>Health for All (HFA)</td>
<td>2008 to 2014</td>
</tr>
<tr>
<td>sec</td>
<td>Percentage of population with at most the lower secondary school degree (first level up to age 14) **</td>
<td>Health for All (HFA)</td>
<td>2008 to 2014</td>
</tr>
<tr>
<td>perc-pub</td>
<td>Percentage of public expenditure over the whole healthcare expenditure</td>
<td>Health for All (HFA)</td>
<td>2008 to 2013</td>
</tr>
<tr>
<td>HCserv-pop</td>
<td>Number of Community based services for each region weighted for the regional population (per 10,000)</td>
<td>Health for all (HFA)</td>
<td>2008 to 2013</td>
</tr>
<tr>
<td>unp</td>
<td>Percentage of unemployed over the active population</td>
<td>Health for All (HFA)</td>
<td>2008 to 2014</td>
</tr>
<tr>
<td>eld</td>
<td>Percentage of elderly (65+) over the population</td>
<td>Health for all (HFA)</td>
<td>2008 to 2014</td>
</tr>
<tr>
<td>smk</td>
<td>Percentage of smokers over the population</td>
<td>Health for All (HFA)</td>
<td>2008 to 2014</td>
</tr>
<tr>
<td>sogg</td>
<td>Number of immigrants’ permits</td>
<td>Health for All (HFA)</td>
<td>2008 to 2014</td>
</tr>
</tbody>
</table>

*Per capita values are weighted by regional population

** The variables addressing education are weighted by population aged 15 and more
4.2. Empirical strategy

Italy has a regional setting and maintains interregional differences over time. With reference to the healthcare sector, after the implementation of federalism, which started in 2000 with Ministerial Decree 56/2000, there are 20 autonomously administered regional Healthcare Systems (Brenna, 2011). Cultural and socioeconomic factors contribute to the identification of regional borders: some aspects, such as the attitude towards the public services or the familiarity with the fiscal rules, pertain to the regional background (Putnam et al., 1994; D’Attoma, 2017), and do not vary across time. In order to account for regional time invariant variables that could be correlated to the regressors, the fixed effects OLS specification was chosen. The equation is the following:

\[ y_{it} = \alpha_i + \beta x_{it} + \epsilon_{it} \]

where the constant term \( \alpha_i \) captures the effects of those variables that change across regions but are invariant through time, the dependent variable \( y_{it} \) is represented by the amount of per capita HTCs for each region i during the 6 years’ time span; \( x_{it} \) represents each independent variable i at the time t, and \( \beta \) is the coefficient to be estimated for each selected variable. \( \epsilon_{it} \) is the error term (Baltagi, 2008). The Hausman test confirmed the appropriateness of the fixed effects model versus the random effect model.

Different model specifications, including log-specification, were tested employing the Akaike information Criterion (AIC), in order to find the best-fitting regression model. The variable unemployment, initially chosen among the variables addressing the socioeconomic status, had to be drop out, after running the Variance Inflation Test, because it was highly correlated with per capita income.

The final specification is the following:

1) \[ htc_{pc} = \alpha + \beta_1 inc_{pc} + \beta_2 prim + \beta_3 sec + \beta_4 perc-pub + \beta_5 HCServ + \beta_6 eld + \beta_7 field + smk + \beta_8 sogg + \epsilon \]

Output available from the author
5. Discussion of results

Full results are reported in Table 2. The variables of interest are those addressing income and education. Per capita income, as expected, is highly significant, despite the value of its coefficient being very small (0.0066). However, this means that, among regions, after controlling for education and other factors explaining the demand for healthcare services, the higher the per-capita income, the higher the size of per capita HTCs. People residing in regions that along years experienced a rise in per capita income, claimed more HTCs. This result corroborates both national and international literature’s findings and raises policy concerns on the equitable aims related to HTCs. The variable prim, which represents the percentage of people with at most the primary school degree, or no education at all, has been chosen in order to capture another aspect related to the use of HTCs, which is the ability of claiming HTCs (i.e. store the receipts during the fiscal year and summing up all the healthcare costs when fulfilling the tax return), or the familiarity with fiscal rules. Evidence exists from international literature on the difficulties of claiming HTCs by people with low education (Smart et al., 2005), but this issue has not yet been developed by national literature.

Tab. 2: Regional amount of per capita Healthcare Tax Credits

| Dependent variable: | Coef.      | Std. Err.   | P>|t| |
|---------------------|------------|-------------|-----|
| htc_pc              | 0.0064***  | (0.0009)    | 0.000|
| inc_pc              | -0.6295*** | (0.1435)    | 0.000|
| sec                 | 0.0982     | (0.1868)    | 0.600|
| percpubsp           | -0.2730*** | (0.0918)    | 0.004|
| HCserv              | 0.0044***  | (0.0013)    | 0.001|
| eld                 | 1.2752**   | (0.5309)    | 0.018|
| smk                 | 0.2729**   | (0.1108)    | 0.016|
| sogg                | 0.0000***  | (4.48e-06)  | 0.002|
| cons                | -56.6500***| (19.5567)   | 0.005|

Numb. Obs. 120
Numb. Groups 20
R-sq: within 0.9208
   between 0.9626
   overall 0.9387
F(8,92) 133.72
Prob > F 0.0000

p < 0.1, ** p < 0.05, *** p < 0.01
OLS fixed effects regression
Tab. 3: Regional amount of per capita Healthcare Tax Credits – prim substituted by pov.

| Dependent variable: | Coef.   | Std. Err. |     P>|t| |
|---------------------|---------|-----------|-------|
| htc_pc              |         |           |       |
| inc_pc              | 0.0068*** | (0.0010)  | 0.000 |
| pov                 | -0.0111 | (0.0800)  | **    |
| sec                 | 0.2302  | (0.2031)  | 0.260 |
| percpubsp           | -0.4131*** | (0.0946)  | 0.000 |
| HCServ              | 0.0050*** | (0.0014)  | 0.001 |
| eld                 | 2.4748*** | (0.5158)  | 0.000 |
| smk                 | 0.2850**  | (0.1219)  | 0.022 |
| sogg                | 0.0000*** | (4.91e-06)| 0.001 |
| cons                | -96.3152*** | (19.0671) | 0.000 |

Numb. Obs. 120
Numb. Groups 20
R-sq: within 0.9043
between 0.9373
overall 0.9110
F(8,92) 108.64
Prob > F 0.0000

*p < 0.1, ** p < 0.05, *** p < 0.01
OLS fixed effects regression

The share of people having just primary education or no education is both highly significant and negative. This coefficient is significant through different model specifications previously run (including log specifications) and demonstrates that education has an impact on the use of HTCs. This result is rather significant for policy objectives, because it suggests that, after controlling for per capita income, the higher the share of people with very low education within one region, the lower the per-capita HTCs.

It might be objected that people with no education are generally at the bottom income class, so that the effect of education can be biased by other socioeconomic factors. However, if we substitute prim with another socioeconomic variable strictly correlated to it (correlation index = 0.6263), which is the percentage of households living in poverty (pov), the latter is not significant. This means that it is specifically a very low education, and not the condition of poverty, that has an impact on the explained variable (see Tab. 3). A possible explanation on poverty is that people who are poor normally are not subject to taxation; however, results show that among people subject to taxation, the less educated make less use of HTCs. This evidence is corroborated by the fact that another educational regressor, sec, which is the percentage of people having the lower secondary school degree, is not significant. It suggests that only people with a very low or no education do not make use of this tool. Being less educated could be associated to a minor ability of understanding the fiscal rules and to less care in keeping and storing the receipts indispensable to claim HTCs.
With reference to the other covariates, both variables addressing the supply of health care services are both highly significant; as it might be expected, the percentage of public health expenditure is negative. Instead, the number of community services for each region is positive, albeit very low in its coefficient, and may suggest the presence of supplier induced demand.

The coefficient related to the share of elderly over the population, is highly significant and actually remarkable. A 1% increase in this quantity along years, would drive to a 1.28-unit increase in the per capita HTCs. Ageing is a determinant of healthcare services’ access, but this result suggests that the elderly make specifically a higher use of the private access. Two other reasons may explain this result. First of all, since the majority of the elderly are retired and receive a pension, tax evasion phenomena are less likely to occur among them; secondly, the elderly might be more attentive in keeping and storing the receipts indispensable to HTCs. However, this is just an intuition that should be empirically investigated. The variable used as a proxy of the need of health, \( smk \), is also highly significant, as well as the variable indicating the presence of immigrants, albeit the latter nearly null (coeff. = 0.0000145).

5.1 Robustness check

A potential limitation of the model specification is the absence of regressors able to control for tax evasion phenomena. Evidence exists on a major attitude of ignoring fiscal rules by individuals residing in the Southern regions with respect to Northern population (Putnam et al., 1994; D’Attoma, et al., 2006). Although the fixed effects model should capture the time invariant effects related to regional attitudes, such as tax payers’ behaviors, the robustness of the main model was further checked by shaping a model whose sample is restricted to the pensioners. The Ministry of Economics and Finance defines pensioners as “those who declare to receive a pension regardless of others types of incomes’ availability”. Since the pensions are directly provided by the Revenue Agency, tax evasion phenomena, limited to this kind of income, are under control. With reference to fiscal data, it was then possible to determine variables able to replicate, within a restricted sample, the variables employed in the general model.

For what is concerning socioeconomic variables, the database “Health for All” does not provide information on specific categories of workers, but it is possible to get information on population aged 65+, which in Italy is a good proxy of population who are retired. Even adopting this criterion, not all the information are disaggregated by age, henceforth it was necessary to build three
variables, which would capture the distribution of both education (up to primary degree; up to lower secondary degree) and poverty among the elderly.

The first two variables, addressing education, are labeled respectively \( eld_{prim} \) and \( eld_{sec} \) and are built by multiplying the percentage of elderly by the percentage of people with at most either primary or lower secondary degree\(^6\). The variable addressing poverty, labeled \( eld_{pov} \), is the product of the percentage of elderly by the percentage of households who live in poverty. Although the distribution of either education and poverty is not homogeneous among classes of different ages, the reported variables could be considered as proxies to capture these two features among elderly population.

The following specification tries to replicate equation 1, within a target population represented by people who are retired and get a pension. All observations are expressed as regional averages.

\[
2) \quad htc_{pc65} = \alpha + \beta_1 inc_{pc65} + \beta_2 eld_{pov} + \beta_3 eld_{prim} + \beta_4 eld_{sec} + \\
\quad \beta_5 perc_{pub} + \beta_6 HCserv_{65} + \beta_7 sogg_{65} + \beta_8 smk_{65} + \epsilon
\]

with \( htc_{pc65} \) = per capita HTCs, weighted by population over 65 (elderly population); \( inc_{pc65} \) = per capita income weighted by elderly population; \( eld_{pov} \) = proxy addressing the percentage of elderly who are poor; \( eld_{prim} \) = proxy addressing the percentage of elderly with at most primary school degree; \( eld_{sec} \) = proxy for addressing the percentage of elderly with at most the lower secondary degree (up to the age of fourteen); \( perc_{pub} \) = percentage of public expenditure over the whole healthcare expenditure; \( HCserv_{65} \) = number of community based services for each region weighted by elderly population (per 10,000); \( sogg_{65} \) = number of regular permits among elderly population; \( smk_{65} \) = percentage of smokers among elderly population.

Results are reported in table 4. The Hausman test suggested to refuse fixed effects specification in favor of a random effects model, which is understandable, since the new specification does not assume the presence of omitted time invariant regional variables.

\(^6\) Since the variable education is weighted by the population aged 15 and over (see table 1), it was necessary to adopt the same weight for the variable addressing the elderly, i.e. to weight people aged 65 and over by people aged 15 and over.
Tab. 4: Regional amount of per capita Healthcare Tax Credits among pensioners

| Dependent variable: Htc-pc65 | Coef.    | Std. Err. | P>|z| |
|-----------------------------|----------|-----------|-----|
| inc_pc65                    | 0.0070***| (0.0008)  | 0.000 |
| eld_pov                     | 0.2334   | (0.6599)  | 0.724 |
| eld_prim                    | -0.3439**| (0.1602)  | 0.032 |
| eld_sec                     | 0.1390   | (0.1495)  | 0.353 |
| perc_pub                    | -0.8895***| (0.1865)  | 0.000 |
| HCserv_65                   | 0.6670***| (0.1824)  | 0.000 |
| sogg65                      | 0.0009***| (0.0001)  | 0.000 |
| smk65                       | 0.1734   | (0.1738)  | 0.318 |
| cons                        | -5.5564  | (24.7109) | 0.822 |

Numb. Obs. 120
Numb. Groups 20
R-sq: within 0.9144
between 0.9396
overall 0.9364
wald chi2 (8) 1239.87
Prob > chi2 0.0000

*p < 0.1, **p < 0.05, ***p < 0.01, random effects GLS regression

Results corroborate the findings addressed by the general model. Per capita income is highly significant and positive, albeit rather small in its coefficient, whereas the variable addressing poverty is not significant. As for education, the variable chosen as a proxy for very low education among the elderly population is significant (p<0.05) and negative. Having a very low education impacts negatively on the amount of HTCs. The variable addressing the share of elderly with at most the lower secondary school degree (up to the age of fourteen) is not significant.

The controls confirm the results of the general model, in terms of significance and sign. The only variable that turned out to be not significant is represented by smk65, which does not seem to be a good proxy for the elderly’s needs of health care.

All in all, the results suggest that, among pensioners, controlling for variables explaining regional differences in the health care access, the selected socioeconomic variables play a role in the average tax credits at the regional basis.

6. Concluding remarks

The use of HTCs is highly debated by national and international literature due to its controversial effects on income distribution.
With reference to the Italian case, evidence suggests that HTCs tend to favor the richest part of the population (Barbetta et al., 2013; Di Novi, 2017). The present analysis corroborates these findings and adds a policy sensitive factor in explaining HTCs distribution among regions. It demonstrates that, controlling for disposable income and other factors explaining the regional demand of healthcare services, the level of education plays a role in addressing regional differences of per-capita HTCs. The share of people with only primary education or no education at all, has a negative impact on regional per capita HTCs, which means that people living in regions showing the same per capita income, but a higher share of individuals with low education, claim less HTCs. A possible explanation, which is also addressed by international literature, is that people with lower education are less used to fiscal rules and probably less diligent in keeping all the receipts and using them when fulfilling the income taxation schedule (Smart & Stabile, 2005). Whatever the cause, concerns arise on the consequences. Public money is reimbursed to regions where people are on average richer and better educated. The tool of HTCs, whose rationale is that of alleviating the fiscal burden for people who need healthcare access, turns out to be mostly regressive and to accentuate the Italian North South divide (Shankar, 2003; Franzini & Giannoni, 2010).

The amount of HTCs in 2014 is 2.62 billion euros, and represents 2.3% of the public health expenditure. Since this public money is reimbursed to finance prominently private healthcare access by the richest part of the population, it would be worth thinking of other measures, such as reducing waiting times within the NHS, to favor healthcare access by people in need of care. Another possible solution, able to guarantee patient free choice among public and private services, could be represented by a monetary bonus for low income people, to be spent either for private access or for public services’ copayment.

The last issue addressed by the analysis, relates to population ageing. At the regional level, a 1% increase in the share of the population over 65 years, results in 1.28 euro per capita HTCs’ increase. The magnitude of this coefficient raises concerns on the NHS’s ability to cope with the augmented need due to population ageing. Since in almost all the regions people over 65 are not subject to copayment, results show that the elderly make large use of private services and this evidence suggests that some kind of integrative insurances for individuals getting older should soon be considered and implemented.
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