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

Elenka Brenna

Abstract

In several countries, taxpayers are given the option to deduct from gross taxation a share of their out of pocket healthcare expenditure. This 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, personal income tax.

JEL Classification: I14; H31; H51

1. Introduction

In several western countries, taxpayers are given the option to deduct 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 or considers the former to provide a "better quality" compared to the latter. 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 services, but the North-South gradient observed for HTCs, could also reveal a different ability of employing this tool, which may be associated to socioeconomic variables. Claiming HTCs 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 (Smart&Stabile, 2005). The North-South gradient in terms of HTC 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 HTCs, 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 HTCs and provide new highlights for the analysis of this fiscal tool. Income is positively correlated to HTCs, 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 HTCs. 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 efficiently allocated to reduce waiting times in the provision of services covered by the 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

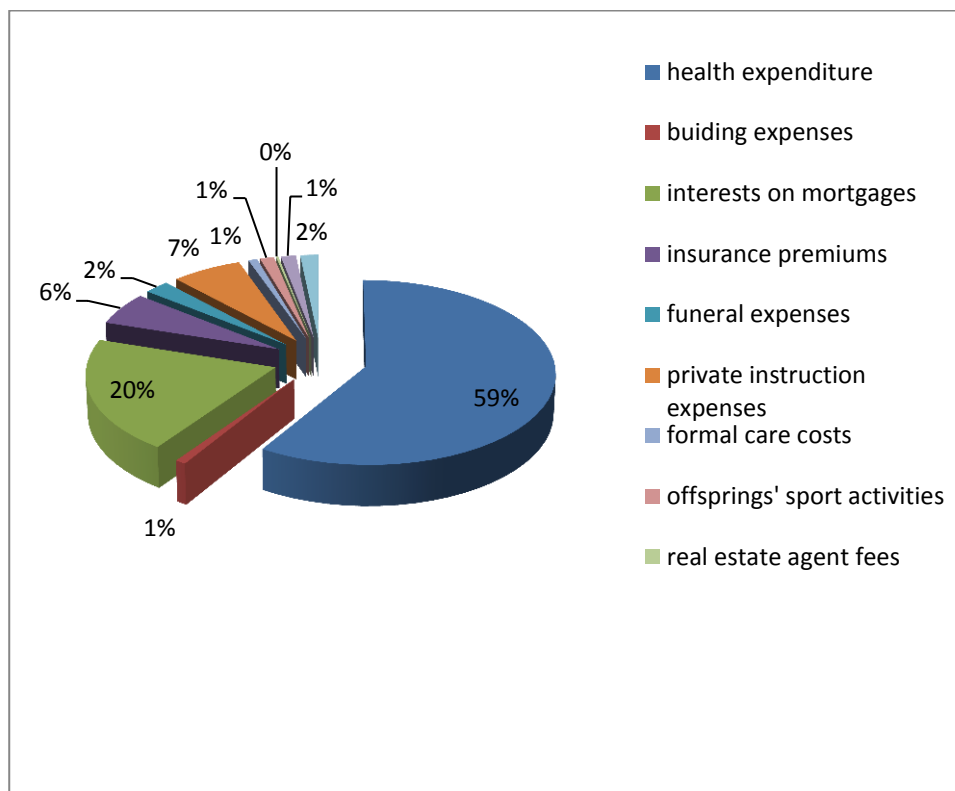
acknowledges an individual's right (access to health or education) or supports a choice that increases the community welfare (Friedman, 1962; Burman, 2003; Batchelder et. al. 2006). From the government standpoint, TCs represent a financial cost, or less availability of public resources, since claimants pay less taxes (Savodoff, 2004).

The economic principle supporting healthcare tax credits is that of diminishing 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 Beveridgian Systems, results are more controversial: for the Italian case, a recent work of Di Novi et al. (2017) suggests that HTC 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, belong to the category of expenditures that can be partially deducted from gross taxation, in the measure of 19%. Within this class, healthcare costs 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 euros¹. Given a taxable income of 817,252 million euro, HTCs represents 0.3% of it (Ministry of Economics and Finance).

¹ Healthcare expenditure can be deducted only for the amounts overwhelming the threshold of 129,11 euros

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



Source: elaboration of data from the Ministry of Economics and Finance

In Italy access to care is free, except for a copayment applied to many goods and services. However, patients are given the possibility to 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 health services with respect to 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.

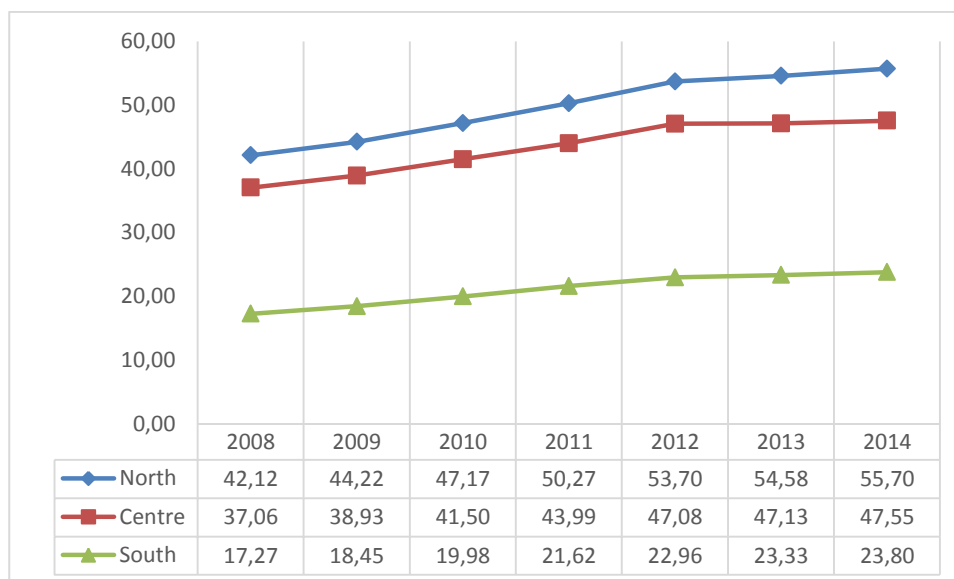
Evidence shows a heterogeneous pattern in the use of HTC among Italian regions, with a clear North-South Gradient. Figure 2 reports, for the years 2008 to 2014, the HTCs' per capita value referred to the three different Italian geographical areas, respectively North, Centre and South². Per

² Liguria, Lombardy, Piedmont, Aosta Valley, Emilia-Romagna, Friuli-Venezia Giulia, Trentino South Tyrole 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.

capita values are represented by the ratio between the annual volume of HTC 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; private insurance premiums are not covered by HTCs.

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 Italy³. 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

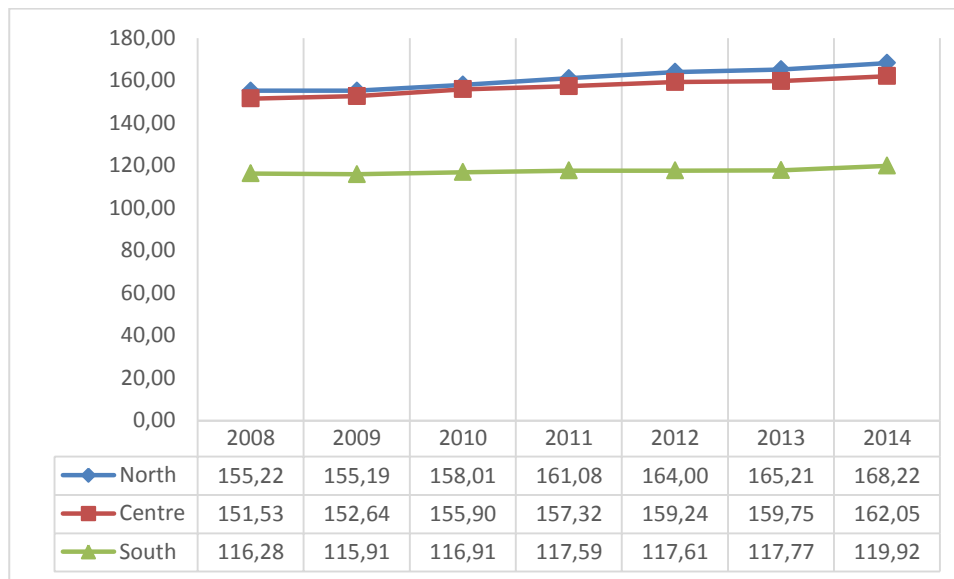


Source: elaboration of data from the Ministry of Economics and Finance, 2016

*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.

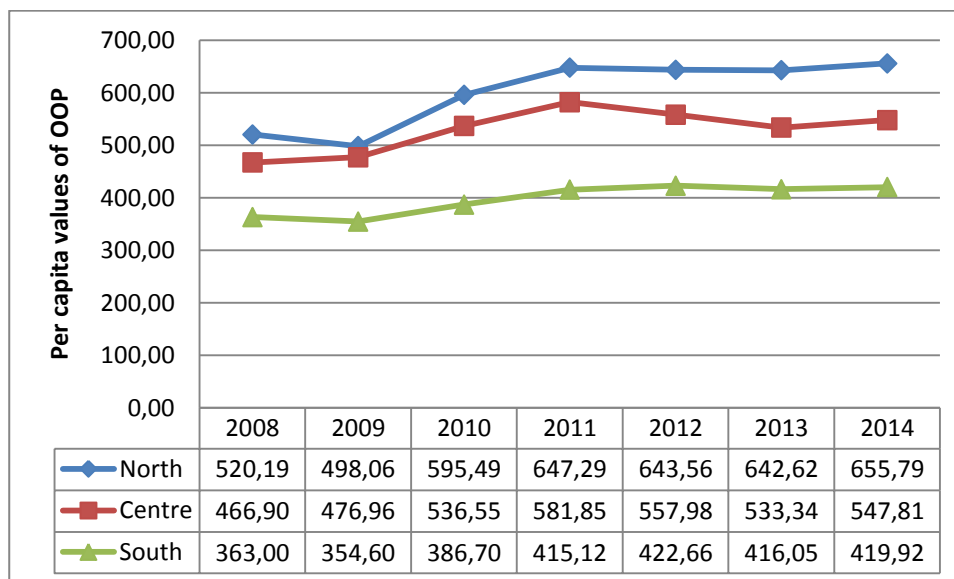
³ This variable is interesting because it explains the difficulties of using HTCs among taxpayers. In fact only a share of people subject to the personal income tax (IRPEF) makes use of HTCs and this share follows a North South gradient. In the time-span observed, the share is 46% in the North of Italy, 43% in the Centre and only 34% in the South of Italy.

Figure 3: Trend of HTC's weighted for the number of claimants – Regional clusters*: years 2008-2014 – values in euros



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



Source: elaboration of data from HFA, 2016

Since HTC's 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 HTC's.

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 HTC_s (i.e. the regional total amount of HTC_s weighted by regional population) by regressors related to three groups of variables, specifically variables addressing the socioeconomic status of regional population, variables related to healthcare expenditure, and a group of selected demographic and health 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 HTC_s 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). Data drawn from this source includes, beside the yearly *amount HTC_s*, which, once weighted for the population, is the explained variable, the *regional number of taxpayers*, the *total amount of taxable income* and the *number of claimants HTC_s*. For each of the mentioned variables it was possible to further disaggregate the data into categories of tax payers

(pensioners, employed, self-employed, and so on). 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.

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 *copayment expenditure*, which represents a small share of OOP, was included among regressors with the aim of observing its impact on the value of HTCs. Data on copayment is drawn from the NSIS (Nuovo Sistema Informativo Sanitario), a database managed by the Ministry of Health. Another variable which is related to OOP expenditure, but is not a multiplier of HTCs, is the *total amount of healthcare expenditure covered by the NHS*. Within regional Healthcare Systems, once the top of the regional healthcare budget is reached, availability of public services becomes scarce, waiting times are very long, and the demand of healthcare services, especially for patients with a very inelastic demand, may be shifted to the private access. Furthermore, the greater the public healthcare expenditure, the greater the amount of money due for the copayment, and henceforth the higher the OOP. This point is however controversial because, in the absence of regional budget constraints, an increase in public healthcare expenditure is expected to allow patients to make more use of public services with respect to private ones. In the case of a significant p value, it is henceforth interesting to observe whether the coefficient shows a negative or positive sign.

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 least 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. This is an important information because it captures the effect of a lower education on HCTs regional differences.

Demographic and health conditions' variables, 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. Their logarithmic form was also derived for possible model specification.

The variables employed in the final specification and their features are reported in Table 1.

Table 1: Variables employed in the model

<i>Variable</i>	<i>Description</i>	<i>Source</i>
<i>htc-pc (dependent vb)</i>	Per capita value* of regional HTCs	Elaboration on data on personal taxation (IRPEF) drawn by the Ministry of Finance (MEF)
<i>inc-pc</i>	Per capita value of regional income	Ministry of Finance (MEF)
<i>cop-pc</i>	Per capita value of regional copayment expenditure	NSIS Database from Ministry of Health
<i>phe-pc</i>	Per capita value of public health expenditure	Health for All (HFA)
<i>unp</i>	Percentage of unemployed over the active population	Health for All (HFA)
<i>prim</i>	Percentage of people with at least primary education or no education	Health for all (HFA)
<i>sec</i>	Percentage of people with at least secondary education (first level, up to 14 years)	Health for All (HFA)
<i>eld</i>	Percentage of elderly (65+) over the population	Health for all (HFA)

<i>smk</i>	Percentage of smokers over the population	Health for All (HFA)
<i>sogg</i>	Number of immigrants' permits	Health for All (HFA)

*Per capita values are weighted by regional population

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. This kind of specification is used with panel data that report time-variant observations related to entities, such as countries, regions, companies: although each entity is represented by values that change over time, there are other aspects not included in the model that correspond to the individual characteristics of each entity. The fixed effects specification includes a term that captures these entity-related aspects (Baltagi, 2008). The equation for the fixed effect model is the following:

$$y_{it} = \alpha_i + \beta x_{it} + \varepsilon_{it}$$

where the constant term α_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 7 years' time span; x_{it} represents each independent variable i at the time t , and β is the coefficient to be estimated for each selected variable. ε_{it} is the error term. The

Hausman test was run in order to establish the appropriateness of the fixed effects model *versus* the random effect model.⁴

Different model specifications, including log-specification, were tested employing the Akaike information Criterion (AIC), in order to find the best-fitting regression model. Finally, two models were selected, which differ over the inclusion of the per-capita income among regressors. This variable is highly negatively correlated with unemployment (-0.78%) and also positively correlated with public healthcare expenditure (0,48%), therefore multicollinearity may bias the results. The Variance Inflation Factor (VIF) test confirmed the necessity to drop out per-capita income. For the purpose of the analysis, at least in a preliminary phase, the inclusion of per-capita income among regressors is crucial: if per-capita income coefficient is positive and significant, as it is expected to be, this evidence would confirm the regressive imprinting of HTC's reported in literature and suggests that new policies could be addressed in order to avoid inequalities.

In the second model specification, which represents the chosen model, per-capita income was dropped. After this transformation, public healthcare expenditure turned out to be significant, and the coefficient of unemployment, which previously showed a positive and not significant value, became significant and negative, which makes sense: if unemployment rate increases, per-capita HTC's decrease.

Here are the two models' specifications:

$$1. \text{ htc_pc} = \alpha_i + \beta_1 \text{inc_pc}_t + \beta_2 \text{cop_pc}_t + \beta_3 \text{phe_pc}_t + \beta_4 \text{unp}_t + \beta_5 \text{sogg}_t + \beta_6 \text{prim}_t + \beta_7 \text{sec}_t + \beta_8 \text{eld}_t + \beta_9 \text{smk}_t + \varepsilon_{it}$$

$$2. \text{ htc_pc} = \alpha_i + \beta_1 \text{cop_pc}_t + \beta_2 \text{phe_pc}_t + \beta_3 \text{unp}_t + \beta_4 \text{sogg}_t + \beta_5 \text{prim}_t + \beta_6 \text{sec}_t + \beta_7 \text{eld}_t + \beta_8 \text{smk}_t + \varepsilon_{it}$$

5. Discussion of results

Full results are reported only for equation 2 (see Table 2)⁵. Regarding the first equation, the variable of interest is represented by per capita income. This is highly significant ($p < 0.01$), despite the value of its coefficient being very small (0.0066). However, this means that, among regions, after

⁴ Output available from the author

⁵ For equation 1) results are reported in appendix

controlling for socioeconomic factors and other factors explaining the demand for healthcare services, the higher the per-capita income, the higher the size of per capita HTC. People residing in regions with higher level of per-capita income would benefit more from this instrument. This evidence confirms results of the previous literature (Barbetta et. al, 2013, Di Novi et. al., 2017) and raises policy concerns on the equitable aims related to HTCs.

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

Dependent variable:	Coef.	Std. Err.	P> t
<hr/>			
htc_pc			
<hr/>			
cop_pc	0.2094***	(0.0321)	0.000
phe_pc	0.0084**	(0.0033)	0.012
unp	-0.1901*	(0.1131)	0.096
eld	2.3798***	(0.5740)	0.000
prim	-0.6002***	(0.1773)	0.001
sec	-0.3172	(0.2074)	0.129
sogg	0.0000***	(4.42e-06)	0.000
smk	0.1251	(0.1167)	0.287
cons	-19.9211	(16.4158)	0.227
<hr/>			
Numb. Obs.	140		
Numb. Groups	20		
R-sq: within	0.8909		
between	0.7484		
overall	0.7611		
F(8,112)	114.37		
Prob > F	0.0000		

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

OLS fixed effects regression

With reference to equation 2), once the per capita income has been dropped, the regressors showing a significant p value are, respectively, copayment expenditure, public healthcare expenditure, unemployment, the share of elderly over the population, the variable chosen as a proxy of very low education, and the regressor addressing the number of immigrants regularly living and working in Italy.

Analyzing the specific impact of each regressor, copayment has a direct effect on HTCs, because it is a part of OOP expenditure. The interest resides in observing the magnitude of its coefficient: controlling for all the other covariates, one euro's increase in the per-capita copayment would result in 0.21 increase in htc_pc. Interestingly, the public healthcare expenditure also has a positive and significant impact on htc_pc, although its impact is small. More public expenditure possibly involves more copayment, but there could be an indirect effect too: in the presence of regional budget constraints, the higher the public expenditure the more likely a shift of part of the healthcare costs to the private access, once the top of regional budget has been reached. This point needs to be

further investigated.

The share of unemployed over the population has a negative effect ($p < 0.1$) on *htc_pc*, by 20 cents for each incremental unit. The coefficient related to the share of elderly over the population, is highly significant ($p < 0.01$) and actually remarkable. A 1% increase in this quantity, would drive to a 2.4 units increase in the per capita HTC. 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, 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.

For the purposes of this paper, the more interesting result, in terms of policy implications, relates to the educational level. 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 and demonstrates that education has an impact on the use of HTCs. Specifically, a one percent increase in the share of population with no education or just primary education would lead to 0.6 unit decrease in the per capita HTCs. This result is rather significant for policy objectives, because it suggests that the higher the share of people with very low education within one region, the lower the per-capita HTCs. Controlling for all the other socioeconomic factors, education plays a role in explaining the use of HTCs. This is true also in the first regression, where per capita income is among the controls and *prim* is negative and significant, and suggests that people with no education are less able to claim HTCs. Furthermore, if we substitute *prim* with another socioeconomic variable strictly correlated to it, which is poverty⁶, the latter is not significant, which means that it is specifically a very low education, and not a the condition of poverty, that has an impact on the explained variable. 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 secondary school degree (up to the age of fourteen), 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.

As for the other covariates, the variable used as a proxy of the need of health, *smk*, is not significant, while the variable indicating the presence of immigrants is highly significant, albeit

⁶ Results available from the author

nearly null (coeff. = 0.0000186).

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 new model where the dependent variable was changed. The chosen variable is represented by the *percentage of claimants HTCs over the total number of taxpayers* (*perc_cl*), which can be considered a proxy of the attitude to claim HTCs among taxpayers. Since it is weighted for the number of taxpayers at regional level, it should capture the incentive to claim HTCs independently from tax evasion phenomena. Regressors remain unchanged and the equation is the following:

$$3. \text{perc_cl} = \alpha_i + \beta_1 \text{cop_pc}_t + \beta_2 \text{phe_pc}_t + \beta_3 \text{unp}_t + \beta_4 \text{sogg}_t + \beta_5 \text{prim}_t + \beta_6 \text{sec}_t + \beta_7 \text{eld}_t + \beta_8 \text{smk}_t + \varepsilon_{it}$$

Results are reported in table 3

Tab. 3: regional share of claimants over the taxpayers

Dependent variable:	Coef.	Std. Err.	P> t
Perc_cl			
cop_pc	0.1638***	(0.0194)	0.000
phe_pc	0.0071***	(0.0020)	0.000
unp	0.2526***	(0.0682)	0.000
eld	1.1682**	(0.3458)	0.001
prim	-0.5592***	(0.1068)	0.000
sec	-0.1977	(0.2074)	0.116
sogg	5.27e-06*	(2.66e-06)	0.050
smk	0.2076**	(0.0704)	0.004
cons	-1.9711	(9.8907)	0.842
Numb. Obs.	140		
Numb. Groups	20		
R-sq: within	0.9442		
between	0.5781		
overall	0.6724		
F(8,112)	236.96		
Prob > F	0.0000		

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

The variable of interest, *prim*, is still negative and highly significant, which means that, controlling for all the other covariates, a one percent decrease in the share of people with a very low education would raise the share of claimants by 0.5%. This evidence confirms that, for each region, the average educational level has an impact on the attitude of claiming HTC among taxpayers.

Regressors that were significant in the main model remain significant in the robustness check too. The percentage of smokers over regional population becomes significant in the robustness check and shows a non-negligible coefficient (0.2), suggesting that this variable has an impact on OOP payments. The variable related to unemployment shows a higher degree of significance and turns out to be positive in the robustness check. Since the dependent variable is represented by a ratio where the number of unemployed impacts on both numerator and denominator, albeit with a different weight, this change is not surprising. It does however reveal an important feature of unemployment which the previous model specification didn't detect. At the regional level, an increase in the unemployment share would produce a rise in the share of claimants over taxpayers, but a decrease in the amount of per-capita HTCs, the latter effect due presumably to both average income and OOP's fall.

Before concluding, another limitation of the main model specification relates to the regional differences in the supply of private healthcare services. In the presence of "supplier induced demand" effects, a higher concentration of private healthcare services may raise the probability of choosing private rather than public services. Unfortunately, no data was available on this issue, so problems with model's misspecification can't be excluded.

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 socioeconomic variables, the level of education plays a role in the ability of claiming 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 cause, which is also addressed by 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 of 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, could be reached by providing low income people with a monetary bonus, 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 2.4 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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APPENDIX

Table related to equation 1- Model encompassing per-capita income

Dependent vb:	Coef.	Std. err.
htc-pc		
inc-pc	0.0063221***	0.0009051
cop-pc	0.1014393**	0.0310332
phe-pc	0.0044976	0.0028069
unp	0.0739506	0.1019675
eld	1.049741*	0.5168628
sogg	0.0000196***	3.70e-06
prim	-0.5152937**	0.14891
sec	-0.0208536	0.1787052
smk	0.167925*	0.0979748
cons	-76.91539***	15.98279
Numb. Obs.	140	
Numb. Groups	20	
R-sq: within	0.9242	
between	0.9638	
overall	0.9419	
F(9,111)	150.46	
Prob > F	0.0000	

* p < 0.1, ** p < 0.05, *** p < 0.01

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