# The political economy of health detractions: Private supply drives personal health expenditures?

## A spatial approach at municipal level

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# Trend of tax expenditures in Italy, 2016-2023

## RAPPORTO ANNUALE SULLE SPESE FISCALI 2023

(art. 21 c. 11-bis legge 31 dicembre 2009, n.196)

| | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | Diff agev.ni 2023/2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| N. agevolazioni fiscali erariali (t) | 444 | 466 | 513 | 533 | 602 | 592 | 626 | 625 | | 40,80% |
| Minor gettito erariale (t+1) (mld) | | 47,8 | 54,6 | 61,7 | 62,4 | 68,1 | 83,2 | 82 | 105 | |
| N. agevolazioni fiscali locali (t) | 166 | 170 | 197 | 180 | 184 | 129 | 114 | 114 | | -31,30% |
| Minor gettito fiscalità locale (t+1) (mld) | | 39,5 | 35,3 | 42,3 | 44,8 | 44,2 | 45,4 | 43,6 | 47 | |
| Totale n. agevolazioni | 610 | 636 | 710 | 713 | 786 | 721 | 740 | 739 | | 21,10% |
| Totale minor gettito (t+1) (mld) | | 87,3 | 89,9 | 104 | 107,2 | 112,3 | 128,6 | 125,6 | 152 | |
| Pil nominale tendenziale (mld) | 1.689,70 | 1.736,60 | 1.771,10 | 1.794,90 | 1.660,60 | 1.822,30 | 1.946,50 | 2051 | 2131 | |
| % minor gettito rapporto al PIL | | 5,03% | 5,08% | 5,79% | 6,46% | 6,16% | 6,61% | 6,13% | 7,13% | |

**Table 1:** Trend in number of tax expenditures (2016-2023) and financial effects (2017-2024)

# The increase in tax expenditures

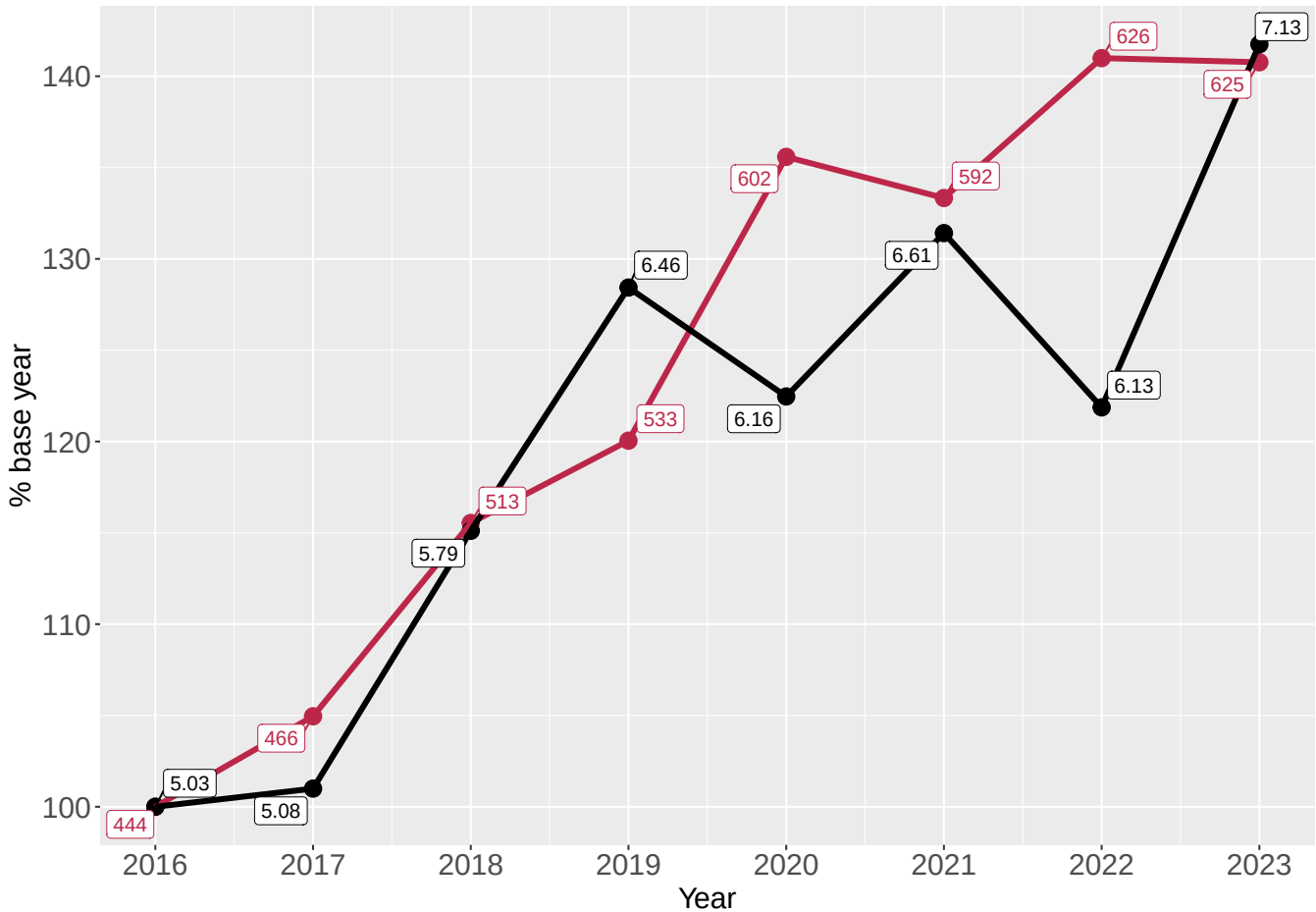



**Figure 1:** Italian tax expenditures, number (red line) and the % of less revenue to GDP (year t+1) (black line), Fiscal year 2016-2023 (base year 2016), % and absolute values in points label.

# Institutional framework: the task of the Commission

**What**: "*An annual report on tax expenditure is attached to NADEF (Nota di aggiornamento del DEF), listing any form of exemption, exclusion, reduction of taxable income or tax or favourable regime*"

**Who**: Commission on Tax Expenditure, Ministry of Economy and Finance,

**Assigned tasks**: to provide an inventory of total TEs, no policy proposal... but some suggestions for 'item by item' revision or some attempt to set a cap (or a limit 'across the board')

# What do we know?

**Large increase** of TEs in the last 10 years
$\Rightarrow$ Need to assess effects on **efficiency, tax revenue (cost), fairness and territorial equity**

- number of items and cost
- towards which territories do they tend to polarise?
- Which income classes do they favour?
- What market distortions tax expenditures cause?

We focus our analysis on **health tax detractions** at municipal level [19% of healthcare expenditures from the personal income tax, no spending cap, but franchise (129.11 euro)]

# Rationale

## Stylised facts

1. Citizens tend to prefer the **closest and cheapest health supply**
2. **Tax detractions** may change **citizens' preferences** towards private structures (a more expensive supply)

## Hypotheses to be tested

**Larger local private supply** – in the presence of public reimbursement – may increase (or induce) citizen's demand

## Empirical counterfactual strategy

Check whether **patients, closest to a private health supply**, spend more than the others, all things being equal

# Empirical strategy

# Empirical counterfactual strategy

$ATE$, Average Treatment Effect (ATE) on $Y$, Per-capita health tax expenditure (data aggregated at municipal level)
$CtP$, Closer to private [1 = if the municipality is closer to a private hospital, 0 otherwise]
$X$ = Exogenous loading factors

$$ATE = E(Y^{CtP=1} - Y^{CtP=0}), \text{ being equal } X$$

where "being equal $X$" $\Rightarrow$ Propensity-score matching, Augmented inverse-probability weighting, Nearest neighbour matching, Regression adjustment

# Empirical strategy

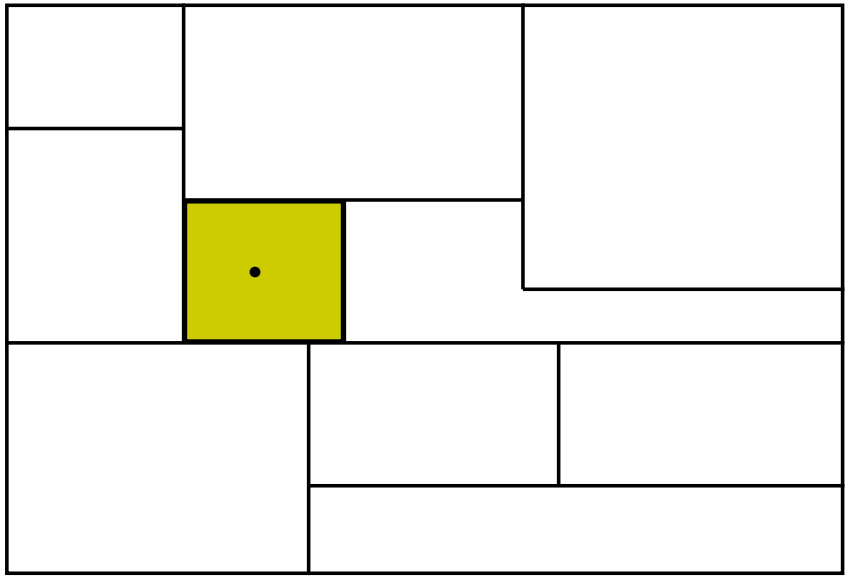


**Figure 2:** Empirical strategy

For each municipality, the variable **closer to private** is equal to 1 or 0 in this way:

# Empirical counterfactual strategy

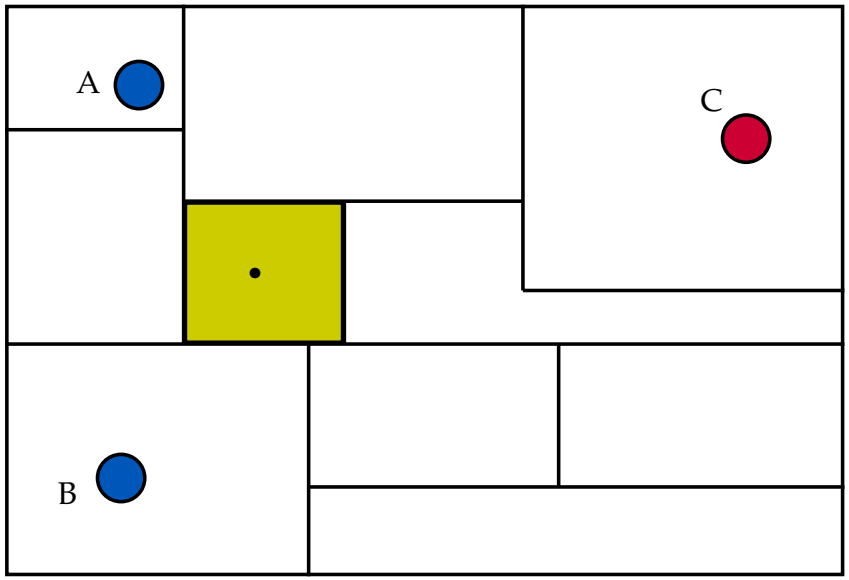



**Figure 3:** Empirical strategy

Public (red) and private (blue) hospitals are geolocalised on the territory; the municipality in which the hospital is located is consistently assigned.

Municipalities with more than one hospital: tested with/without for robustness analysis $\Rightarrow$ robust results

# Empirical counterfactual strategy

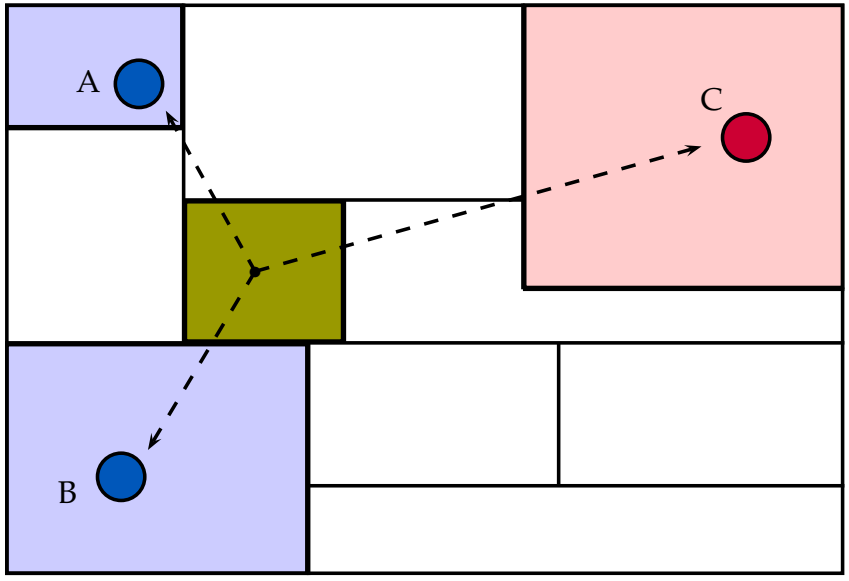



**Figure 4:** Empirical strategy

For **municipalities without hospitals**, the minimum distance to the hospital is calculated

# Empirical counterfactual strategy

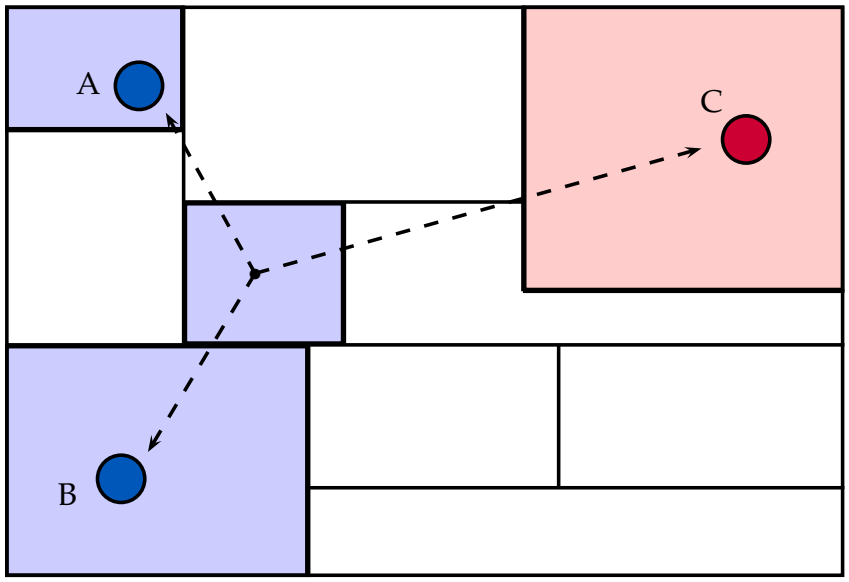



**Figure 5:** Empirical strategy

The municipality is assigned 0 or 1 depending on whether it is closer to private or public

# Causal inference key assumptions

## 1. Causal Consistency (SUTVA)

**Outcome of a municipality is not influenced by the treatment** assignment to other ones

- Municipalities are partitioned into distinct/non-overlapping territorial regions such that a Municipality is not affected by treatments/assignment in the other neighbouring municipalities

# Causal inference key assumptions

**2. Ignorability (Unconfoundedness)**

The treatment assignment should be **independent of the potential outcomes**, given the observed covariates

➔ **Treatment assignment depends only on physical distance and it is, therefore, independent from tax detraction data**, social and economic characteristics of the municipality and the endogenous choices of the municipality itself

# Causal inference key assumptions

## 3. Overlap (Common Support)

Every municipality should have a non-zero probability of receiving either treatment or control = **overlap in the distribution of covariates between the treated and control groups**

- Tested using paired t-test for the difference between the two group means.

# Causal inference key assumptions

## 4. No Measurement Error

The observed data should be **free from significant measurement error**

- The outcome value is an average of a 4-year **official data** = robust data over time - fiscal year 2016-2019 (pre-Covid)
- The treatment allocation is based on a physical rule (relative location of hospitals) and on **reliable data** (Google Maps API based).

# Causal inference key assumptions

## 5. No Hidden Confounders

**All relevant confounding variables should be measured** and included in the analysis.

- In addition to the global DID estimate, **local DID estimates** have been also carried out using Geographic Weighted estimation of the treatment $\Rightarrow$ also the local unobserved confounders are taken into account.

# Data and Main results

# Data

**What**: **Health tax detractions** related to PIT with an **unparalleled level of municipal granularity**

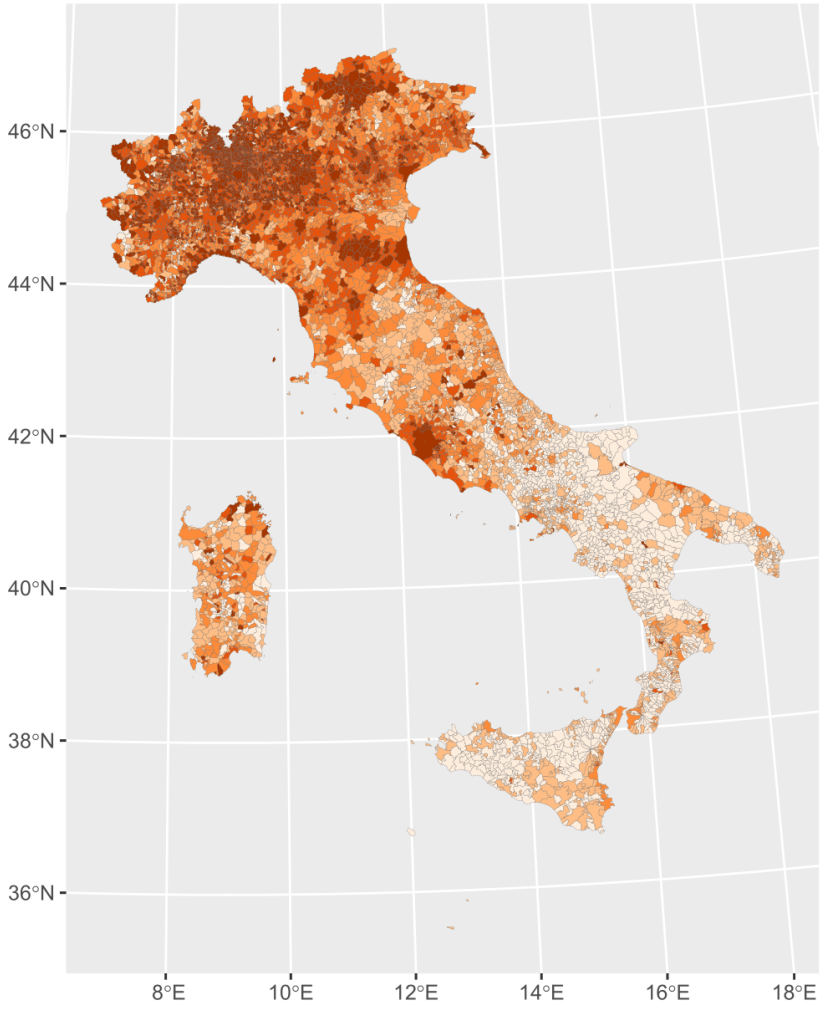
**Source**: Ministry of Economy and Finance (Dipartimento delle Finanze)

**Timeframe**: fiscal year 2016-2019, pre-Covid

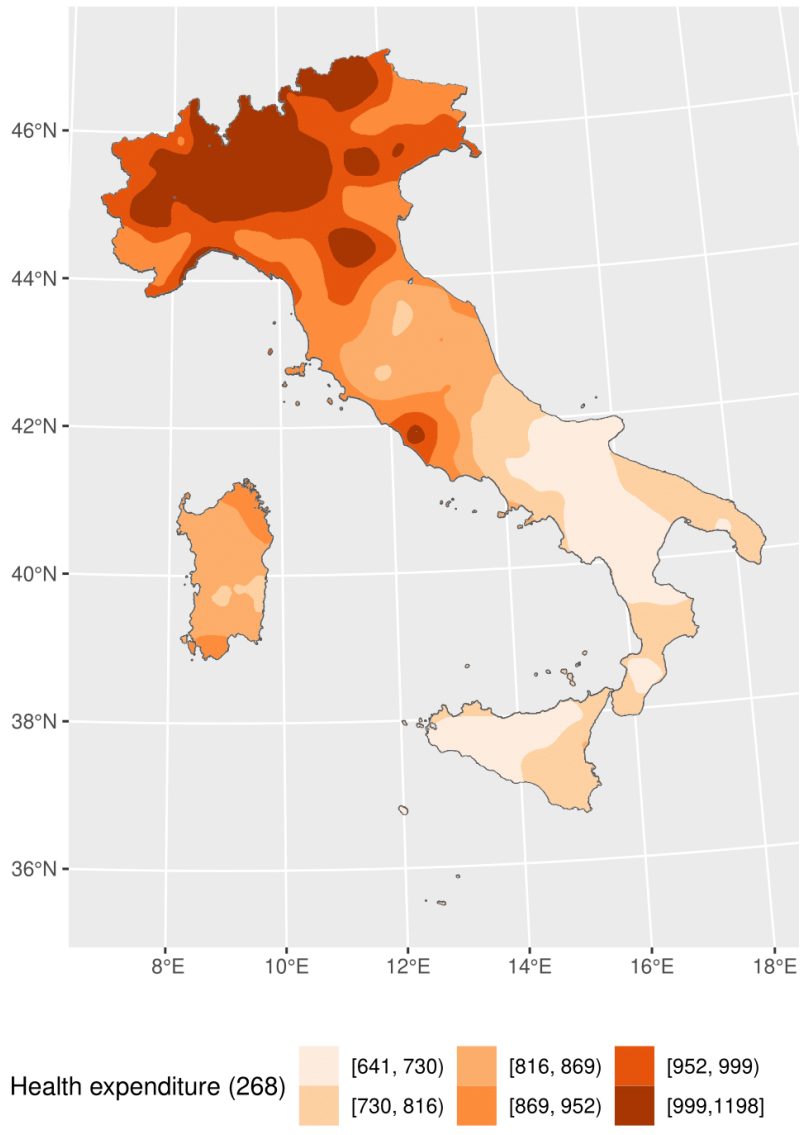
**Number of municipalities**: 7,756 (outlier or missing data for privacy)

In addition to municipal data on health tax expenditures, geographical data (latitude and longitude) of **606 private and 800 public hospitals** or clinics have been collected.

# Health tax expenditure by municipality




Raw data



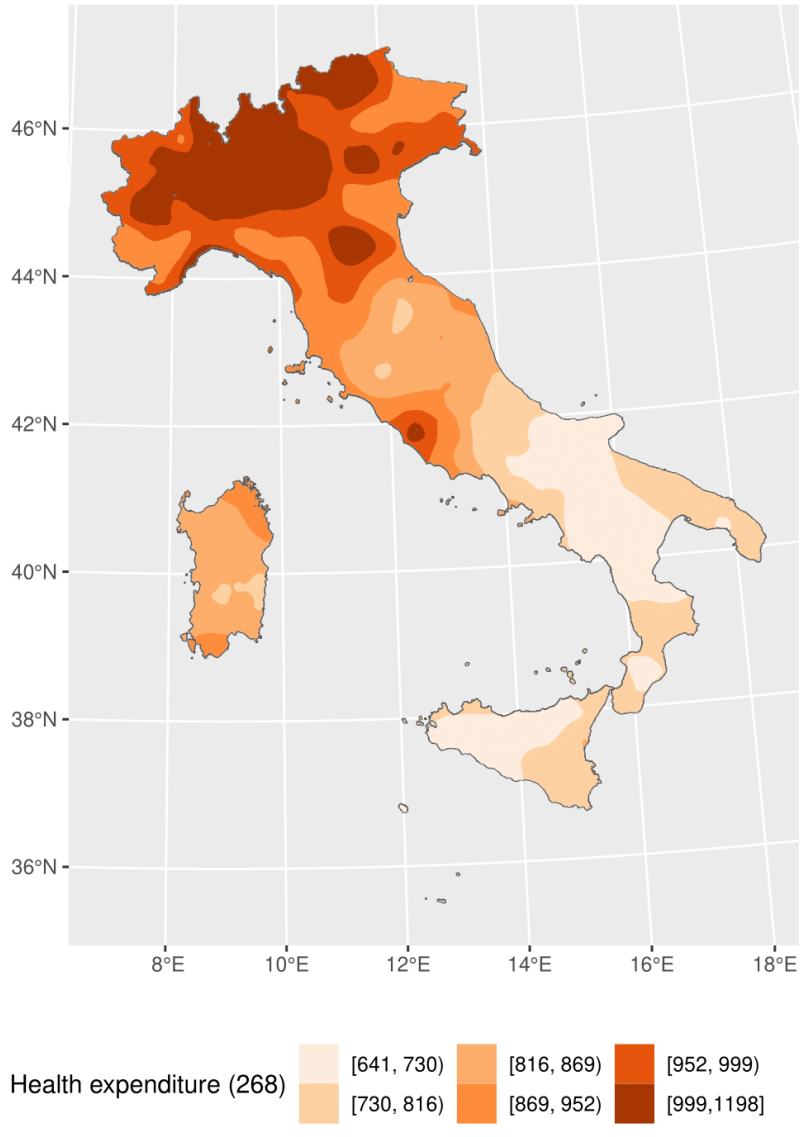

Kriging interpolation

# Health tax expenditure by municipality

- **Higher average expenditure in the North and in big cities** (Bologna, Rome)

- This is to be expected because richer citizens, different demographic structure, higher local prices and so on

- Need to depurate from local exogenous factors




Kriging interpolation

# OLS estimates

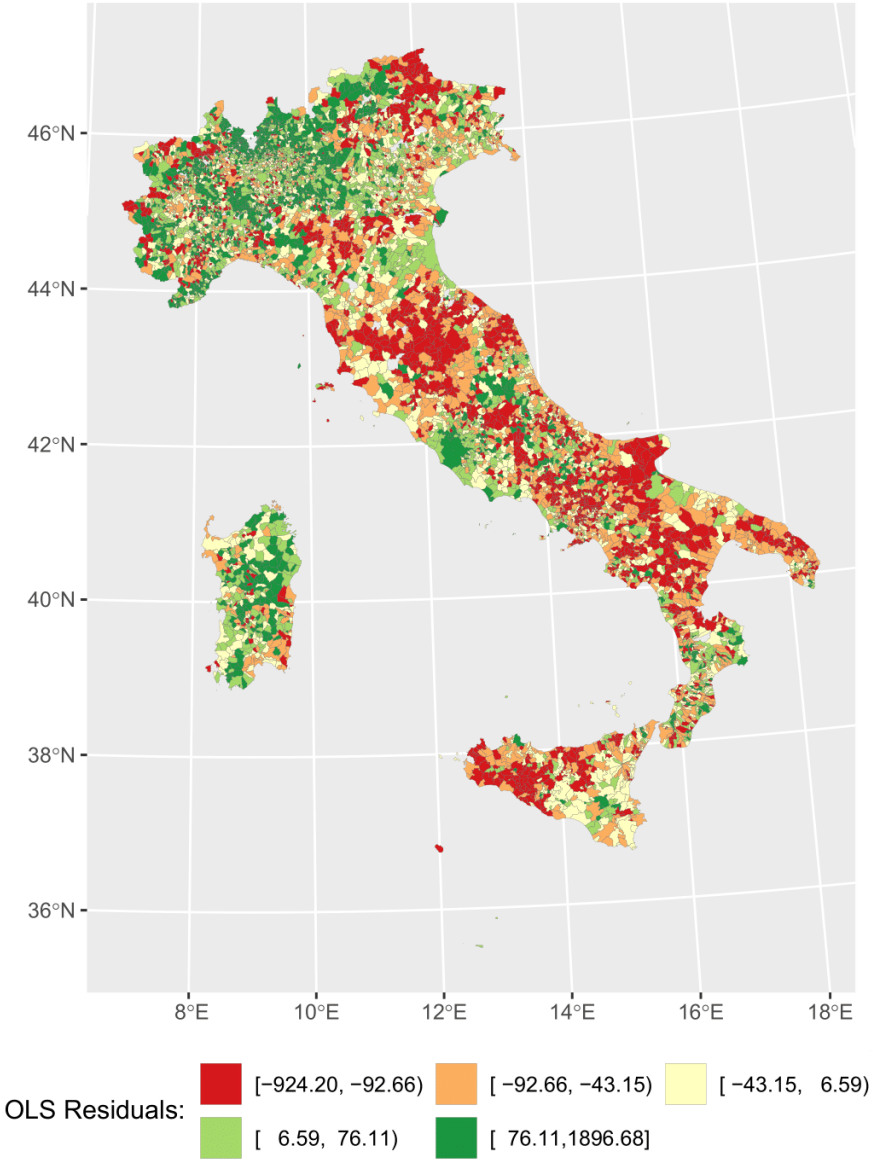
| | *Dependent variable:* | | |
|---|---|---|---|
| | Health tax expenditure per capita | | |
| | (1) | (2) | (3) |
| Per capita income | 0.047*** | 0.047*** | 0.046*** |
| | (0.002) | (0.002) | (0.002) |
| Per capita income (square) | −0.00000*** | −0.00000*** | −0.00000*** |
| | (0.00000) | (0.00000) | (0.00000) |
| Resident population aged 0-14 | | 0.018** | 0.015* |
| | | (0.009) | (0.009) |
| Resident population aged 15-64 | | −0.006** | −0.006** |
| | | (0.002) | (0.002) |
| Resident population over 65 years | | 0.008*** | 0.007*** |
| | | (0.002) | (0.002) |
| OMI price (Euro/mq) | | | 6.592*** |
| | | | (1.085) |
| Constant | 204.294*** | 201.746*** | 203.543*** |
| | (22.486) | (22.496) | (22.446) |
| Observations | 7,756 | 7,756 | 7,756 |
| $R^2$ | 0.482 | 0.483 | 0.486 |
| Adjusted $R^2$ | 0.482 | 0.483 | 0.485 |
| Residual Std. Error | 127.859 | 127.775 | 127.480 |
| | (df = 7753) | (df = 7750) | (df = 7749) |

*Note:* *p<0.1; **p<0.05; ***p<0.01

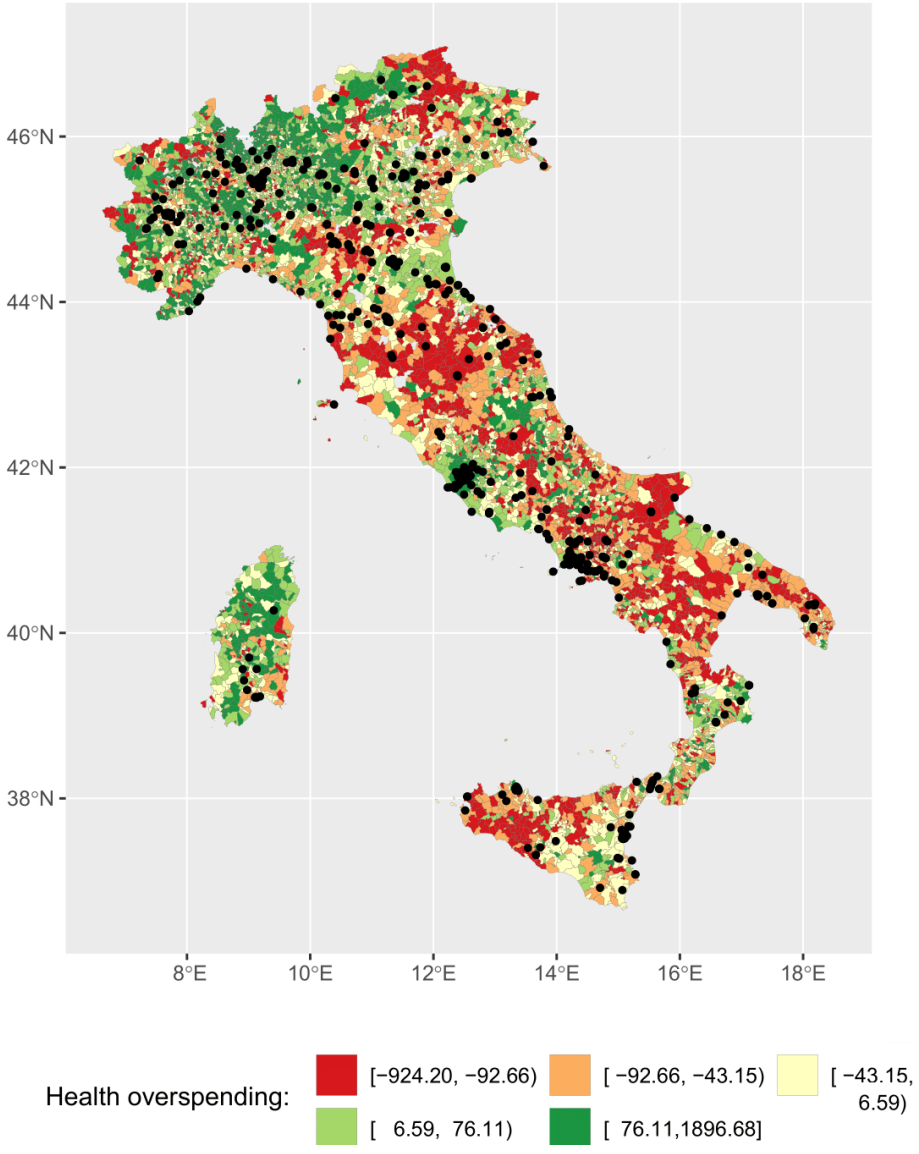
# Health overspending

Positive OLS residuals = health detraction overspending (respect to the conditional mean)

Some parts of the territory systematically spend more than average, others less than average



# Health overspending and private supply




**Question**: **private healthcare supply generates more healthcare spending** (all other factors being equal)?

Let's overlay the private supply with our data and calculate the closer to private treatment variable for each municipality

# Treatment-effects estimation

Treatment-effects estimation (ATE coefficients), Treatment model: logit (7,838 units)

| | Estimator | ATE | Std. err. | z | P>z | [95% conf. | interval] |
|---|---|---|---|---|---|---|---|
| Closer to private (1 vs 0) | Prop. score | 11.036 | 3.148 | 3.510 | 0.000 | 4.867 | 17.205 |
| | Augmented IPW | 9.735 | 2.733 | 3.560 | 0.000 | 4.378 | 15.092 |
| | Nearest-neighbor | 9.057 | 2.954 | 3.070 | 0.002 | 3.268 | 14.846 |
| | Reg adjust. | 9.665 | 2.683 | 3.601 | 0.000 | 4.406 | 14.924 |

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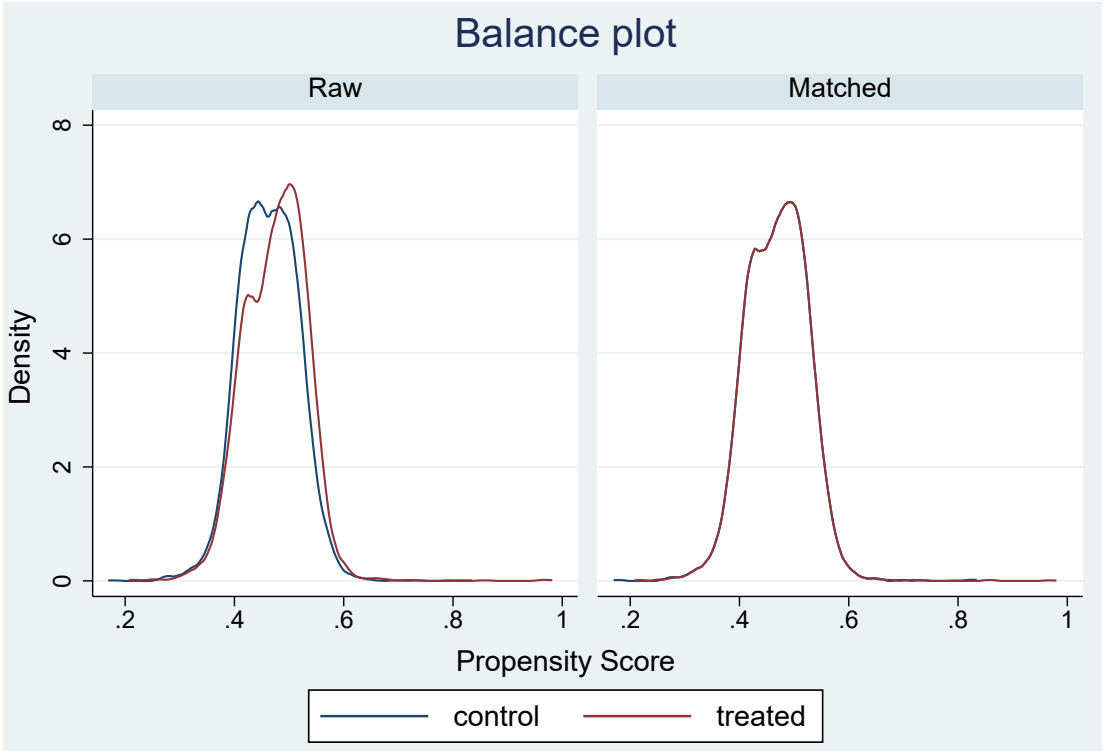
**Proximity to a private healthcare provider** has a positive systematic effect on tax detractions ($\sim$10€ per-capita)

This effect is **robust to changes in the estimator**

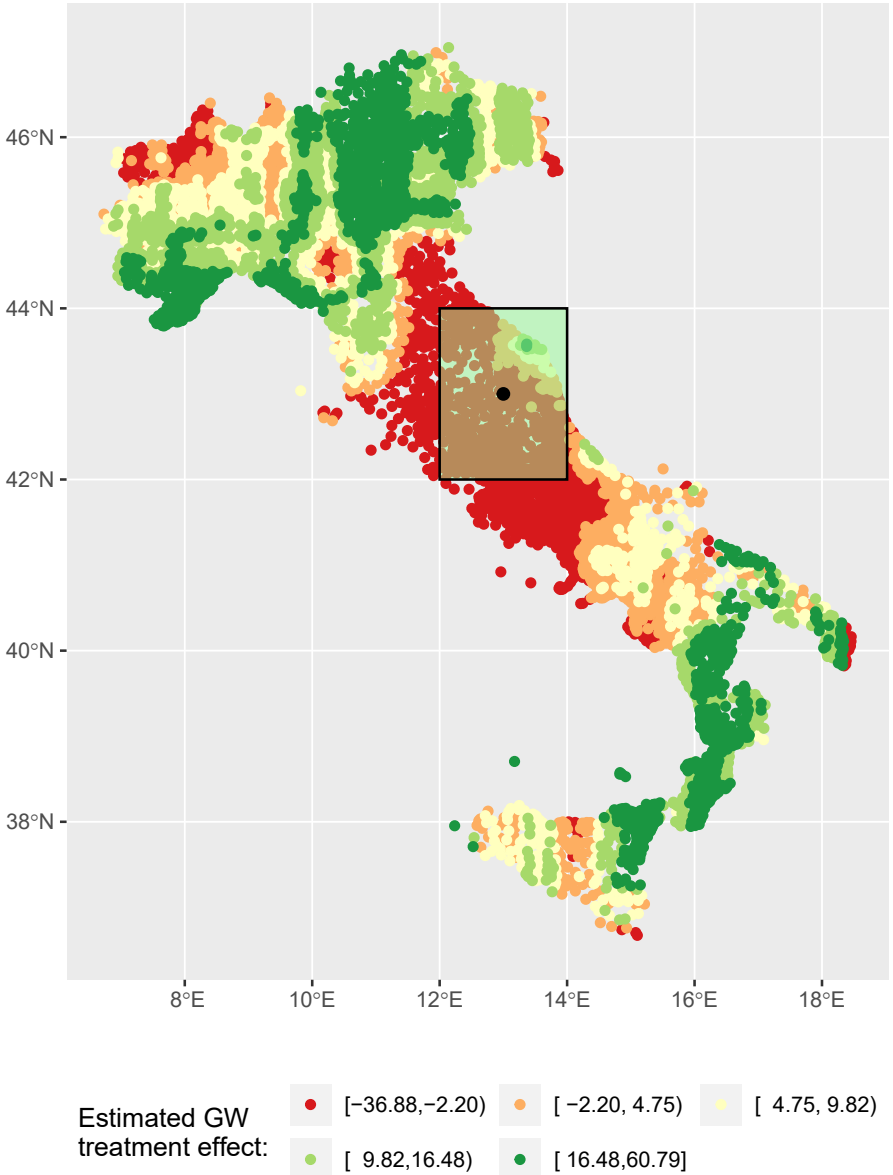
# Treatment-effects, Common support assumption

## 3. Overlap (Common Support)

Every municipality should have a non-zero probability of receiving either treatment or control = overlap in the distribution of covariates between the treated and control groups.



# Estimated GW treatment effect



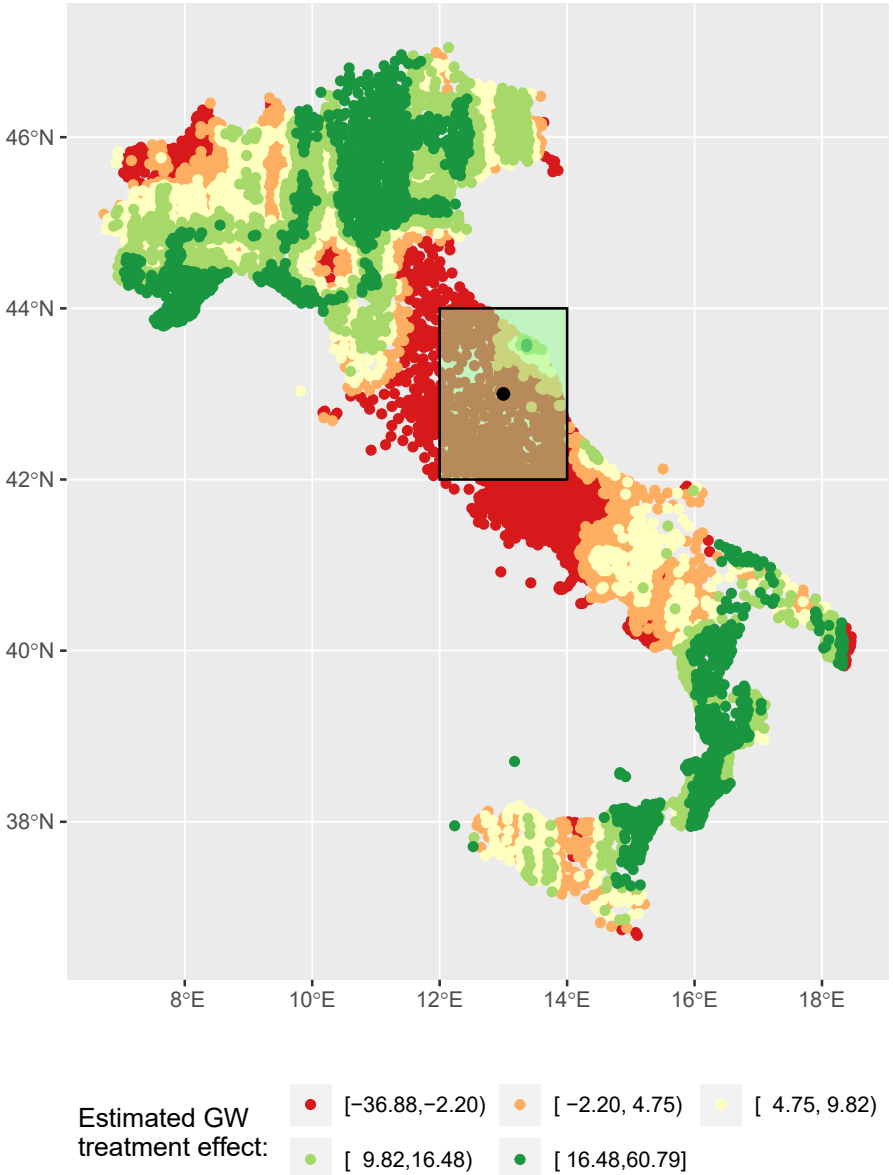

## 5. No Hidden Confounders

**All relevant confounding variables should be measured and included** in the analysis

- To control hidden confounding variables we estimate the DID model locally

- For each municipality we create an estimation window obtaining an estimate of the difference for each municipality

# Estimated GW treatment effect




- **Strong spatial non-stationarity**

- **Northern regions** (Piedmont, Lombardy, Veneto): show positive and very strong differential effects (30-40€)
- **Centre** (Tuscany, Lazio): not significant
- **Calabria**: positive effect probably due to lack of appropriate public supply

# Policy implications

- Health detractions are **highly territorially unequal** (even if exogenous factors are equal)
  $\Rightarrow$ **more to richer regions**;
- **Proximity** to a private healthcare provider has a **positive systematic effect** on average requested detractions
  $\Rightarrow$ A **portion of the health tax expenditures** is used to reward the differential between public and private supply;
- Key issue: **Private supply is substitute (in terms of quantity/quality/waiting times) or complementary?** What kind of health expenditure should the state subsidise?
- What effect on **equity / public budget / income distribution**?