cesifo WORKING PAPERS

10655 2023

September 2023

Taxation and Mobility: Evidence from Tax Decentralization in Italy

Enrico Rubolino, Tommaso Giommoni

CESifo

Impressum:

CESifo Working Papers
ISSN 2364-1428 (electronic version)
Publisher and distributor: Munich Society for the Promotion of Economic Research - CESifo GmbH
The international platform of Ludwigs-Maximilians University's Center for Economic Studies and the ifo Institute
Poschingerstr. 5, 81679 Munich, Germany
Telephone +49 (0)89 2180-2740, Telefax +49 (0)89 2180-17845, email office@cesifo.de
Editor: Clemens Fuest
https://www.cesifo.org/en/wp
An electronic version of the paper may be downloaded
· from the SSRN website: www.SSRN.com
· from the RePEc website: www.RePEc.org
· from the CESifo website: https://www.cesifo.org/en/wp

CESifo *Working Paper No. 10655*

Taxation and Mobility: Evidence from Tax Decentralization in Italy

Abstract

We study the impact of taxation on the location choices of individuals and tax bases in Italy. We exploit some recent tax decentralization reforms, which granted regions and municipalities greater power in setting income tax rates across brackets. Combining granular micro-level data on tax residence transfers with tax rate variations both within and across locations, we show that taxation significantly shapes location decisions. The mobility response greatly varies across the income distribution, with higher responsiveness among top incomes. Yet, our estimates imply that revenue losses due to tax-induced mobility are small, making local redistribution feasible at least over the medium-run.

JEL-Codes: H240, H710, J610.

Keywords: local income taxation, migration, tax decentralization.

Enrico Rubolino
Faculty of Business and Economics
University of Lausanne / Switzerland
enrico.rubolino@unil.ch

Tommaso Giommoni
Department of Management, Technology, and Economics, ETH Zurich / Switzerland
giommoni@ethz.ch

September 11, 2023
We would like to thank David Agrawal, Zareh Asatryan, Alan Auerbach, Mike Brewer, Marius Brülhart, Emilia Del Bono, Dirk Foremny, Camille Landais, Sauro Mocetti, Enrico Moretti, Andreas Mueller, Alari Paulus, Davud Rostam-Afschar, Emmanuel Saez, Sebastian Siegloch, Daniel Waldenström, Danny Yagan, Gabriel Zucman and seminar participants at UC Berkeley, IFN Stockholm, Essex, IIPF (Tampere), SIEP (Padua), MaTax (ZEW), NTA (New Orleans), IEB workshop (Barcelona), ECINEQ (Paris School of Economics), EEA (Manchester) for comments. This paper subsumes Rubolino's PhD thesis chapter 1 previously circulated as "Tax-Induced Transfer of Residence: Evidence from Tax Decentralization in Italy", and "The Efficiency and Distributive Effect of Local Taxes: Evidence from Italy". We are responsible of any errors. Rubolino gratefully acknowledges financial support from the Swiss National Science Foundation (grant number 192546).

1 Introduction

Since the seminal contribution of Tiebout (1956), there has been a controversial debate about the degree of tax autonomy that should be granted to local governments. At the center of the debate lies the trade-off between the benefits of diversity in fiscal policies and the costs of losing tax bases when individuals "vote with their feet." This debate is not limited to the academic world, but attracts much attention in the public debate.[1] The threat of tax base mobility puts hurdles on the ability of governments to redistribute income and finance spending through progressive taxation (Mirrlees 1982; Piketty and Saez 2013) and might trigger socially inefficient tax competition (Lehmann et al. 2014).

This paper studies whether taxes affect the location of tax bases and individuals. Despite increased research on migration, a recent survey of the literature (Kleven et al., 2020) has emphasized that "direct empirical evidence on the responsiveness of individual locations to taxes has been remarkably scant." Two empirical challenges are likely to explain the paucity of empirical evidence. First, information on migration patterns across locations is difficult to retrieve. Second, tax variations need to be orthogonal to all the other factors influencing location choices, such as local labor market conditions, public goods provision, and amenities. Furthermore, most of the existing literature has focused on specific segments of the population, such as football players (Kleven et al. 2013), star scientists (Moretti and Wilson 2017), inventors (Akcigit et al. 2022), highly paid foreigners (Kleven et al. 2014), and top incomes (Agrawal and Foremny 2019; Muñoz 2020; Martínez 2022). These taxpayers might be particularly sensitive to taxes, both because they tend to be less tied to specific firms and because their skills are less likely to be location-specific. Therefore, it remains uncertain whether taxes distort the location choice of broader segments of workers, especially in contexts with greater attachment to their communities and local networks (Dahl and Sorenson 2010).

We aim to fill this gap by studying tax-induced mobility responses in Italy, which provides an exciting laboratory for three main reasons. First, Italy is a typical low-mobility country where people have strong family ties (see, e.g., Faini et al. 1997; Manacorda and Moretti 2006) and, although striking differences in labor demand across local labor markets, workers prefer to queue for jobs close to home (Michelacci and Silva 2007; Boeri et al. 2021). The Italian laboratory is thus suitable for studying whether introducing different tax rates across places can impact long-standing attitudes on location choices.

Second, tax authorities have been collecting micro-level data on transfers of tax residence for the *entire* population. This novel dataset allows us to study tax-induced

[1] Within-country transfers of tax residence have recently received much attention in the public debate, following episodes of wealthy taxpayers moving their tax residence for tax purposes (see, e.g., New York Times, "Trump, Lifelong New Yorker, Declares Himself a Resident of Florida", October 2019).

mobility by following individual *tax* locations over time, instead of second-best measures such as the workplace. As the relevant criterion to define the income tax burden of an individual is her tax residence, this distinction matters because the objective functions of both national and local governments should be concerned with where the tax base is ultimately taxed (Slemrod 2010).[2] Furthermore, geographical dispersion in tax rates can also create imbalances between job and residence choices (Agrawal and Hoyt 2018).

Third, we can exploit many sources of tax variation both over time and across individuals within locations. To offer context, Figure 1 illustrates the sources of tax changes leveraged by this paper. Through the early 2000s, the national government severely constrained local tax autonomy, and tax rates hardly differed across places. By contrast, significant variation emerged after 2007 and 2011, when the national government granted municipalities and regions greater power to set different tax rates across income brackets. As a result of this tax decentralization process, the local average income tax rate varied *across locations for a given income level* by as much as 4.9 percentage points in 2015. The tax rate presents variation not only across locations over time, but also *across income brackets for a given location* (see Figure 2). This setup thus offers a unique opportunity to study how taxation affects location choices in a country where income taxes are purely residence-based, and several local public goods (e.g., education and health care) are exclusively provided to their residents.

Guided by a simple theoretical model of cross-municipality tax competition, our empirical analysis distinguishes between two types of behavioral responses to local taxation: mobility across municipalities (extensive margin) and taxable income responses of non-movers (intensive margin). For identification, we leverage within-municipality cross-income bracket tax rate changes generated by adopting a progressive local tax scheme. This strategy allows us to control for municipality-specific time-varying amenities or economic shocks, and to account for secular trends in inequality and cost of living across places and/or income groups. We access several administrative datasets. At the aggregate level, we collect panel data on taxable income and the number of taxpayers for each municipality and income bracket. We then supplement these data with individual-level tax returns data for a large Italian region, collecting, among the others, time-varying information on the municipality of residence. In the final dataset, we exploit 89,860 local tax rate changes implemented since the early 2000s.

We find that local taxation affects location choices: we estimate a statistically significant net-of-tax rate mobility elasticity of 1.2. By contrast, we uncover small intensive margin effects. Our taxable income elasticity estimate is 0.156, which lies in the range of the existing estimates (Saez et al. 2012), but it is imprecisely estimated. We confirm these findings at the individual level, using a simulated instrument approach à la

[2]Income taxes are residence-based in several countries, including Canada, Spain, Switzerland, and some states in the US.

Gruber and Saez (2002) with individual fixed effects. These results survive a suite of robustness checks, including the inclusion of additional controls and alternative empirical specifications. We also show that our estimates are not capturing some preexisting trends across municipalities or tax brackets, nor are the results of local shocks or other contemporaneous policies.

To zoom in on the mobility response, we use novel administrative data that record the origin and destination municipality of almost 12 million tax residence transfers. We use this information to compute the outmigration odds-ratio, that is the probability of moving from an origin to a destination location relative to the probability of not moving at all. Then, we relate changes in the outmigration odds-ratio to changes in the net-of-tax rate differential across location pairs to estimate the mobility elasticity. By focusing on changes over time, within a given location pair, the model absorbs all time-invariant factors that can shift the demand and supply of individuals across locations, as well as any origin location- or destination location-specific shocks.

We find that the probability of moving from an origin location o to a destination location d significantly increases when the net-of-tax rate in d increases with respect to o. On average, a 1 percent increase in the net-of-tax rate differential raises transfers of tax residence by around 2.2 percent (from a baseline of about 49 individuals moving within a location pair). To get a sense of the magnitude of the estimated mobility elasticity, consider the effect of the increasing tax differential within the Milan (origin)-Rome (destination) pair. Rome and Milan had the same local tax rate (1.4 percent) in 2007, but in 2015 the top marginal tax rate differed by 1.7 percentage points (Rome's tax rate was 4.23 percent, while Milan had a tax rate of 2.53 percent). According to our estimate, the number of individuals moving from Milan to Rome would decrease by around 47.9 individuals every year. Using survey data, we provide suggestive evidence that tax differentials across places affect job commuting: the probability of living in the same municipality as the workplace significantly responds to tax rate changes. This suggests that individuals are willing to accept longer commute times in return for lower income tax rates (Agrawal and Hoyt 2018).

The magnitude of the mobility response greatly varies along the income distribution. We document a marked income gradient of increasing tax responsiveness along the income distribution. The mobility elasticity in the top income bracket (above 75,000 euros) is around twice as much as the elasticity for the bottom income group (below 15,000 euros). We also show that the mobility response is dampened among individuals facing higher mobility costs or frictions, such as married individuals, the elderly, and homeowners. Tax-induced mobility is also relatively lower in places with higher public goods provision. This suggests that individuals with stronger preferences for locally provided public goods are considerably less mobile (Brülhart et al. 2020).

We use our estimates to forecast the revenue effect of changing local tax rates. For a given tax rate increase, we find that the revenue losses due to behavioral responses do not offset the "mechanical" increase in revenue. Although top incomes appear to be much more responsive to local tax differences than medium and low incomes, we find that the mechanical effect of higher taxes largely dominates the behavioral effects in each income tax bracket. This suggests that Italian municipalities are on the left-hand side of the Laffer curve.

This paper contributes to three main strands of the literature. First, it contributes to the literature studying the effect of taxation on mobility. A series of recent papers have provided compelling evidence on the impact of taxation on the mobility of football players (Kleven et al. 2013), highly paid foreigners (Kleven et al. 2014; Schmidheiny and Slotwinski 2018), inventors (Akcigit et al. 2016), star scientists (Moretti and Wilson 2017), and top incomes or wealthy taxpayers (Schmidheiny 2006; Young et al. 2016; Agrawal and Foremny 2019; Muñoz 2020; Martínez 2022; Brülhart et al. 2022; Agrawal et al. 2023). However, these studies do not provide a conclusive comprehensive answer on the effect of taxation on migration, given that they target specific segments of the population that might be substantially more mobile. As pointed out by Kleven et al. (2020), a critical question that the literature has not addressed is whether income tax rates distort the location choice of broader segments of workers and, if they do, how large the responses are and what are the implications for policy. We attempt to fill this gap using administrative data covering the entire population.

The second contribution is to the literature studying the responsiveness of the tax base to income taxation (see Saez et al. (2012) for a review). To our knowledge, however, no quantitative evidence exists for Italy, a high-tax evasion and relatively high-tax burden country. Moreover, this paper relates with a growing literature exploiting state or local taxes for identifying the impact of tax policies on several economic outcomes, including corporate tax incidence (Fuest et al. 2018), reallocation of business activity (Giroud and Rauh 2019), incidence on welfare of workers or firms (Suárez Serrato and Zidar 2016; Brülhart et al. 2020), job creation (Slattery and Zidar 2020), tax competition (Parchet 2019), misallocation costs (Fajgelbaum et al. 2019), cross-border income shifting (Milligan and Smart 2019), and innovation (Moretti and Wilson 2014; Akcigit et al. 2022).

Finally, our findings have implications for the debate on the costs and benefits of fiscal decentralization. The economic impact of decentralization has been discussed since the pioneering contribution of Tiebout (1956). Tiebout's core idea emphasizes the benefits of diversity in public good provisions and taxation across local jurisdictions. Yet, the threat of tax base mobility is likely to undermine attempts of local governments to perform redistributive policies (Musgrave 1959; Oates 1972; Feldstein and Wrobel 1998). This paper shows that revenue losses from local income taxes are limited, thus making local redistribution feasible at least in the medium run.

The rest of the paper is organized as follows. We set out a simple framework in section 2 to conceptualize the expected behavioral responses to local income tax changes. Section 3 provides information on local income taxation in Italy, and describes the data. Section 4 presents our empirical results, while section 5 discusses the implications of our findings for tax revenue. Section 6 concludes.

2 Theoretical Framework

This section outlines a simple conceptual framework for the expected behavioral responses to local income tax changes. Our model is a cross-municipality version of the cross-country tax competition model à la Lehmann et al. (2014). We model tax competition across two municipalities, labeled $i = A, B$, over nonlinear income tax schedules in a setting with a continuous skill distribution $w \in \{w_o; w_1\}$. A continuous population allows to derive optimal marginal tax rates over the whole municipal income distribution. Each resident can freely move across municipalities at a cost $m \geq 0$. Mobility costs include various psychic and material losses, such as transportation, past earnings, changing neighborhoods, and missing family and friends.[3]

For each municipality i, N_i denotes total population (residents for tax purposes), $h_i(w)$ the skill density, and $H_i(w) = \int_{w_o}^{w} h_i(x)dx$ the corresponding cumulative distribution function (CDF). For each skill level w in municipality i, $g_i(m|w)$ denotes the conditional density of the migration cost, $G(m|w) = \int_0^m g_i(x|w)dx$ is the conditional CDF. Therefore, each municipality has an origin density $g_i(m|w)h_i(w)$ of (m, w) and presents an (exogenously given) mass of individuals $G_i(m|w)h_i(w)$ with skill level w that face migration costs that are lower than m.

Municipal policy makers do not observe m or w, but observe taxable income y and tax individuals through an income tax schedule $T_i(y)$, which may be either flat, $T_i^{'}(y) = 1$, or progressive, $T_i^{'}(y) > 0$. Consistent with the residence principle, individuals pay taxes in their municipality of residence, regardless of where they work.

2.1 Individual Choices

Individuals enjoy consumption, represented by the net-of-tax income $C = y - T(y)$. The disutility of earning income through labor is denoted by $v(y, w)$, with $v_y' > 0 > v_w'$ and $v_y^{''} > 0 > v_{yw}^{''}$. The following quasi-linear utility function describes individual preferences:

$$C - v(y; w) - 1 \cdot m, \tag{1}$$

[3]Since our empirical approach is able to account for heterogeneity in mobility costs along the income (skill) distribution and with respect to the distance between original and destination places, we do not make any theoretical assumption on the correlation between skills and mobility costs.

where 1 is a dummy that turns on if an individual changes the municipality of residence, letting her bear the monetary loss m. The quasi-linearity in consumption implies no income effect on taxable income. This is a reasonable assumption supported by the existing literature (Gruber and Saez 2002).

Individuals make decisions along two main margins: i) how much income to earn (intensive margin); ii) whether to change the municipality of residence (extensive margin). To simplify the exposition, this simple model abstracts from other potential margins of behavioral responses to taxes, such as cross-country migration or movements in and out of the workforce.

2.1.1 Intensive Margin

Each individual of skill w chooses y to solve the following equation:

$$U_i(w) \equiv \max_y C - v(y; w). \tag{2}$$

Letting $Y_i(w)$ be the solution to equation (2), the first order condition is:

$$1 - T_i'(Y_i(w)) = v_y'(Y_i(w); w) \tag{3}$$

How does taxable income respond to a change in the tax rate set by the municipality of residence? Differentiating equation (3) with respect to the net-of-tax rate yields the tax base elasticity in municipality i for individuals of skill w:

$$\epsilon_i(w) = \frac{1 - T_i'(Y_i(w))}{Y_i(w)} \frac{\partial Y_i(w)}{\partial(1 - T_i'(Y_i(w)))}. \tag{4}$$

This elasticity captures the "deadweight loss" of taxation. It accounts for the various channels through which taxation might affect behaviors, including "real responses" (e.g., hours of work, effort) or tax evasion and avoidance.

It is also possible to determine the elasticity of taxable income with respect to the skill level w as:

$$\alpha_i(w) = \frac{w}{Y_i(w)} \frac{\partial Y_i(w)}{\partial w}. \tag{5}$$

2.1.2 Extensive Margin

Each resident in municipality A of type (w, m) makes a mobility decision based on utility comparison between the two municipalities: she moves to municipality B if $U_B(w) + m > U_A(w)$; stays in municipality A otherwise. For each skill type w, the mass of individuals moving from A to B is thus $G_A(U_B(w) - U_A(w)|w)h_A(w)N_A$, while the mass of individuals staying in A is $1 - (G_A(U_B(w) - U_A(w)|w)h_A(w)N_A)$. The behavior of individuals resident in municipality B is symmetric. On aggregate, the mass of residents of type w living in municipality A, defined as $\varphi(w)(U_A - U_B, w)$, depends on the utility differential, $\Delta = U_A(w) - U_B(w)$. Formally, for each municipality, i, the mass of residents is equal to:

$$\varphi_i(\Delta, w) \equiv \begin{cases} \underbrace{h_i(w)N_i}_{\text{stayers}} + \underbrace{G_{-i}(\Delta|w)h_{-i}(w)N_{-i}}_{\text{new residents}} & \text{when} \quad \Delta \geq 0; \\ \underbrace{1 - (G_{-i}(-\Delta|w)h_i(w)N_i)}_{\text{original population minus movers}} & \text{when} \quad \Delta < 0. \end{cases} \tag{6}$$

How the population mass in a municipality would respond to a variation in the utility differential? Taking the derivative of the mass of resident of type w in municipality i with respect to the utility differential yields:

$$\frac{\partial \varphi_i(\Delta, w)}{\partial \Delta} = \begin{cases} g_{-i}(\Delta|w)h_{-i}(w)N_{-i} & \text{when} \quad \Delta \geq 0; \\ g_i(-\Delta|w)h_i(w)N_i & \text{when} \quad \Delta < 0. \end{cases} \tag{7}$$

This result implies that the mass of residents of skill w located in municipality i is increasing with the utility differential. It is possible to rewrite this result in terms of the semi-elasticity of mobility with respect to the utility differential:

$$\eta_i(\Delta_i, w) = \frac{1}{\varphi(\Delta_i(w); w)} \frac{\partial \varphi_i(\Delta_i(w); w)}{\partial \Delta}. \tag{8}$$

This elasticity computes the percentage change in the density of taxpayers with skill w in municipality i as the utility differential changes by 1 percent in municipality i with respect to municipality $-i$.

2.2 Government Choice of Tax Schedule

Following Lehmann et al. (2014), we assume that the governments of A and B are benevolent and design a tax schedule to maximize the welfare of worst-off residents (the so-called maximin criterion). The municipal government sets a tax schedule to finance an exogenous amount of public expenditures $E \geq 0$. Each municipality i faces the following budget constraint:

$$\int_{w_0}^{w_1} T_i(Y(w))\varphi_i(U_i(w) - U_{-i}(w); w)dw \geq E. \tag{9}$$

Assuming away cross-*country* migration, municipalities compete on a common set of taxpayers and choose a tax schedule taking individual choices as given. The best response of municipality i to a municipality $-i$ is the solution to the following problem:

$$\max_{U_i(w),Y_i(w)} U_i(w_o)$$

$$\text{s.t.} \quad U_i'(w) = -v_w'(Y_i(w);w) \quad \text{and}$$
$$\int_{w_0}^{w_1} (Y_i(w) - v(Y_i(w);w) - U_i(w))\varphi_i(U_i(w) - U_{-i}(w);w)dw \geq E, \tag{10}$$

where $U_{-i}(\cdot)$ is given.

Lehmann et al. (2014) derive the optimal marginal tax rates in a Nash equilibrium by re-arranging the first-order conditions of equation (10):

$$\frac{T_i'(Y_i(w))}{1 - T_i'(Y_i(w))} = \frac{\alpha_i(w)}{\epsilon_i(w)} \frac{X_i(w)}{wf^*dx}, \tag{11}$$

where $X_i(w) = \int_{w_0}^{w_1} [1 - \eta^*(w)T_i(Y_i(w))]f^*(w)dw$, $f^*(w) = \varphi_i(U_i(w) - U_{-i}(w);w)$, and $\eta^*(w) = \eta_i(U_i(w) - U_{-i}(w);w)$.

The optimal marginal tax rates differ from those applied in a closed economy (see, e.g., Saez 2001). Even if the two municipalities are identical regarding total residents, skill density and conditional density of migration costs, the optimal tax policy differs from the close economy result because of the threat of migration. In practice, the elasticity of migration is positive as long as the difference in net-of-tax rates in the two municipalities is larger than the cost of moving.

The key empirical parameters needed to derive the optimal marginal tax rates are: i) the intensive margin elasticity, $\epsilon_i(w)$: the taxable income responses of non-movers; ii) the extensive margin (mobility) semi-elasticity, $\eta^*(w)$.[4] To derive the shape of optimal marginal tax rates, the theoretical analysis thus calls for empirical evidence on both the level and the slope of the migration elasticity (on which evidence is missing). The following section will provide estimates of these elasticities, which we will use to derive tax policy implications in section 5.

3 Background and Data

3.1 Local Income Taxation in Italy

Italy is composed of three different sub-national tiers of government: there are 20 regions (*Regioni*), 107 provinces (*Province*), and 7,918 municipalities (*Comuni*). The 1998 tax reform allowed regions and municipalities to levy a surtax on personal income on

[4]In theory, the optimal marginal tax rates would also depend on the elasticity of taxable income with respect to the skill level, $\alpha_i(w)$. We account for this possibility by allowing the elasticity to systematically vary both across municipalities over time (through municipality-year fixed effects) and within a municipality for a given skill level (through municipality-income bracket fixed effects).

top of the income tax rates set by the national government.[5] However, spatial tax rate differences were limited for three reasons. First, the national government capped the regional and municipal tax rates at 1 and 0.5 percentage points, respectively. Second, any tax rate increase could not exceed 0.2 percentage points. Third, the tax rate could not differ across income groups. Geographical dispersion has emerged since 2007, when regions and municipalities have been allowed to raise the tax rate to a maximum of 1.4 and 0.8 percent, respectively, and to introduce an exemption threshold. The final step was the 2011 reform, which allowed regions and municipalities to set different tax rates across income brackets and lifted the top regional marginal tax rate cap to 4 percentage points.[6]

Revenue from local income taxes contributes to financing local public spending and accounts for nearly 16 percent of personal income tax revenue raised in Italy. To simplify the tax collection process, the national government set restrictions on the definition of the tax base and the structure of tax rates and brackets. First, the tax base is uniformly defined and composed of taxable income (i.e., gross income minus deductions), which includes positive incomes from all sources. Second, if regions or municipalities implement a graduated tax scheme, the rates must be: i) structured according to the same income brackets defined by the national personal income tax; ii) diversified and increasing with income. The fact that regions and municipalities share the same tax base and tax brackets guarantees comparability across places and over time. Moreover, local income tax rates cannot be deducted from income taxes paid to the central government. The municipal and regional tax rates are salient to taxpayers: when filing their tax forms, employees find information on both the central, regional, and municipal income tax rates paid. When it comes to paying local income taxes, there are two installments to keep in mind: an initial payment and a final payment. The initial payment, also known as the ″advance,″ amounts to 30 percent of the total tax due. This amount is calculated by applying the municipality's tax rate from the previous year to the taxable income from the previous year. "Advance" payments are accounted for in the construction of the individual-level local tax rates.

Any adult individual can transfer her residence by communicating the new address to the registry office of the previous municipality of residence. Applications are submitted online at zero cost. Local police will then inspect the integrity of the transfer within 45 days.[7] While changing residence can generate a change in tax liability,

[5] See article 50 of law 446/1997 for the regional income tax; article 1 of law 360/1998 for the municipal income tax. Appendix B offers a detailed description of the fiscal decentralization process.

[6] This reform was sudden and unanticipated as it was part of a larger reform approved to face a sovereign debt crisis to increase local revenue and promote fiscal equity.

[7] If the change of residence is not accepted by the origin municipality's local administrators or verified by the destination municipality's police, local administrators cancel the registration and restore the previous registry position. False declarations of residence entail the payment of a fine and up to two years imprisonment (articles 75 and 76 of D.P.R. 445/2000; article 485 of criminal law).

changing *domicile* does not matter.[8] In short, what matters for local taxation is the tax residence: workplace and domicile location have not any (direct) effect on the income tax burden.

3.2 Data and Descriptive Evidence

3.2.1 Aggregate Income Data and Tax Rates

The Italian Ministry of Economy and Finance (*Ministero Economia e Finanza*) provides data on the income and stock of taxpayers for different income intervals and for each municipality. The dataset is based on tax returns data, available over the 2001-2015 period. Income intervals are constant both over time and across municipalities to guarantee comparability. Nominal income data are converted to real income using the consumer price index and 2015 as the base year. The tax unit is the individual, and the definition of income is taxable income (i.e., gross income minus deductions) as defined by the national government. Taxable income consists of all sources of income, such as labor (including pensions), business, and capital.[9]

Table C1 reports information on the aggregate average tax base and the stock of taxpayers in each income group. In the first four columns, we display information on the average tax base (expressed in millions of 2015 euros); the last four columns provide information on the average population in each bracket. Considering that the median (average) population size of a municipality is 2,436 (7,418) individuals, the detailed nature of the data allows us to study even very tiny groups of taxpayers exposed to different tax rates over time and across places under a uniformly defined tax system. For instance, the median (average) number of taxpayers observed in the top income group of a municipality in a given year is only 13 (60).

We match these data with a rich, comprehensive panel dataset that we compiled on local income tax rates for each income bracket and year set by regions and municipalities. In computing the bracket-specific tax rate, we calculate the marginal and average bracket-specific tax rate by also considering the tax exemption cutoff set by municipalities or regions. As the tax bracket intervals are fixed in nominal terms over time and cannot be modified by municipalities or regions, we are able to match the bracket-specific tax rate to its tax base very precisely.[10]

[8]The law defines the residence as the "place of usual residence" and the domicile as the "place of business and interests" (see article 43 of civil code). As a response to larger tax differentials induced by the 2011 reform, a substantial spike in the number of Google searches for "difference domicile and residence" emerged (see Figure A1).

[9]If a municipality has introduced a tax exemption cutoff, we can still observe incomes reported by those below the exemption cutoff as they still have to fill tax returns to pay the national income tax.

[10]Measurement errors might arise when we account for the municipality-specific tax exemption cutoff. As municipalities do not face any constraints in setting the cutoff below which income is not taxed, there are cases where the exemption cutoff differs from the tax bracket cutoffs observed in tax data. In this case, the marginal tax rate in an income bracket is a linear combination of zero and the marginal tax rate applied to the bracket above the tax exemption cutoff.

The fact that the local income tax schedule is fixed in nominal terms generates a *bracket creep*: inflation leads taxpayers to "creep" to a higher bracket and, thus, to face a higher marginal tax rate (Saez 2003). In fact, an upward (downward) trend in the share of taxpayers located in the top (bottom) brackets emerges (see Appendix Figure C1). One concern is that this source of real change in tax rate schedules might systematically differ across places.[11] If this is the case, taxpayers located in places with higher inflation rates would be more likely to "creep" to a higher bracket and thus experience a rise in the marginal tax rate than those with lower inflation rates. Our main empirical approach accounts for this issue by interacting year dummies with dummies for each income bracket and local labor market, thus accounting for any income group-specific differential change in the cost of living across local labor markets.

Out of the potential $7 \times 7,918 \times 15 = 831,390$ income bracket-municipality-year cells, we observe the total tax base, population stock, and the tax rate of 696,111 cells.[12] For a given income bracket-municipality-year cell, we observe 89,920 tax rate changes. As shown in the Appendix Figure C2, tax rate changes became more common in the post-2012 period, when local governments were allowed to set different tax rates across brackets. The modal (average) number of tax rate changes observed in a given income bracket-municipality group over the 2001-2015 period is 2 (1.63). We do not observe any tax rate change in around one-fifth of bracket-municipality cells (see Figure C3).

Table C2 displays the statutory local income tax rate (summing up both the regional and municipal rate) set in the low, middle, and top income brackets for the 20 largest Italian cities. The table presents the tax rate in the years 2001, 2011, and 2015 (for a graphical representation of the tax rate over time, see Appendix Figure C4). Two remarks emerge from this table. First, the tax rate varies *across locations for a given income level*. For instance, in 2015, a rich taxpayer in Rome could reduce her marginal tax rate by 2.3 percentage points by moving the tax residence to Florence. Assuming an income equal to the average income reported in Rome's top tax bracket, this transfer of residence would allow to save around 5,277 euros in taxes per year. Second, the tax rate presents variation *across income groups for a given location over time*. This source of tax rate variation has emerged after the possibility of introducing a tax exemption cutoff and setting a graduated tax scheme. For instance, the tax rate in Rome's top bracket increased by 3.3 percentage points over the 2001-2015 period, while the bottom tax rate raised by 0.83 percentage points over the same period.

Focusing solely on the municipal income tax schedule, Appendix Figure C5 displays whether a municipality sets its tax rate and, if so, whether it is a single flat rate or a

[11] Boeri et al. (2021) show relatively small dispersion in nominal wages across Italian provinces, but substantial heterogeneity in real wages (driven mainly by differences in housing costs).

[12] Taxable income data are not subject to censoring: 94.7 percent of missing values can be attributed to a "real" missing value, i.e., we do not observe any taxpayer in an income bracket-municipality-year cell. In the remaining cases, we are unable to match tax data with income data because of changes in the municipality identifiers across census waves or by unions or divisions between municipalities.

series of different increasing tax rates across brackets. We find that nearly half of the municipalities in the sample taxed income at a flat rate in 2015, despite the share of municipalities with a progressive tax having firmly risen since 2007. Moreover, the number of municipalities without an income tax has shrunk from 3,341 (42 percent) to 1,223 (15 percent) over the period being analyzed (see Appendix Figure C6). We present the bracket-specific municipality tax rate evolution in Appendix Figure C7. On average, we observe a threefold increase in the difference between the top and the bottom bracket since the early 2000s. Differences across middle brackets have also emerged, but are relatively less marked.

3.2.2 Individual Tax Returns

Our second source of data is the universe of individual tax returns from a large Italian region, Veneto.[13] The regional branch of the Tax Agency provides these data over the 2007-2014 period. The dataset includes information on around 26.3 million tax declarations, filed by around 4.2 million taxpayers. It contains rich taxable income data, divided by income sources (i.e., employment, self-employment, business, capital, and pensions). We also observe the municipality of residence reported every year by each taxpayer. This time-varying individual-level information is key, allowing us to study tax-induced mobility responses by reconstructing the evolution in the tax residence of each individual in our sample. We also observe socio-demographic characteristics, such as gender, marital status, date of birth, and nationality, as well as other tax information, such as tax deductions and tax credits. Table C3 reports descriptive statistics. The average gross declared income is 20,892 euros, while the average net income is 16,734 euros. Employees represent about half the workforce (55 percent), while self-employed workers and retirees account for 10 and 34 percent, respectively. Around one-tenth of our sample is composed of foreigners.

We also show summary statistics separately for the population of movers (defined as those that changed their municipality of residence at least once over the period observed in our data) and non-movers. On average, we find that 12 percent of the taxpayers in our sample can be classified as movers. A simple comparison of the observable characteristics of movers versus non-movers reveals several stylized facts. First, movers tend to be younger, with an average age of 41.5, than non-movers, who have an average age of 53. Panel A of Figure 3 shows the distribution of movers by age (as a share of the population in each age group). The figure shows that the probability of having changed the municipality of residence over the previous eight years (the panel dimension in our data) is higher at the time of labor market entry. Then it monotonically declined over the age distribution. On average, around 30 percent of taxpayers

[13] Veneto is an economically important area of the country. According to the Italian Statistical Office, it was the third richest Italian region in 2020. To our knowledge, we are the first to use these tax data (see Giommoni and Rubolino (2022) for a companion paper using the same data source).

in their early 30s have changed their municipality of residence at least once over the analyzed period, against a probability of about 10 percent for 50 years old taxpayers. This pattern could be due to several factors. For example, younger individuals may be more willing to move in search of job opportunities or a better quality of life. In comparison, older individuals may be more established in their current location. Another critical difference between movers and non-movers is their likelihood of being homeowners: only 48 percent of movers are homeowners, compared to 60 percent of non-movers (see Table C3).

A fundamental advantage of this dataset is that it allows us to study mobility along the full income distribution. Panel B of Figure 3 shows that movers are primarily concentrated in the bottom (0-15,000 euros) and lower middle (15,000-28,000 euros) tax brackets, which account for more than 13 percent of the overall population in these brackets. By contrast, movers in the top tax bracket (above 75,000 euros) count for around 9 percent of the bracket population. This descriptive evidence suggests that studies focusing on the mobility responses of top incomes to taxation rest on a relatively small portion of the movers' population.[14] To offer a broader perspective on the distribution of movers, panel C of Figure 3 presents the distribution of movers along the income distribution (as a share of the population in each income percentile). This figure shows that movers are mostly concentrated in the bottom half of the income distribution. The probability of transferring the tax residence (over the previous eight years) monotonically declines in the top half of the income distribution. For instance, movers account for around 15 percent of the share of taxpayers at the middle-income percentile, while for only about 10 percent of the top-income decile.[15]

3.2.3 Transfers of Tax Residence

Our third data source is a novel administrative dataset covering the universe of tax residence transfers, available over the 2007-2015 period. These data are based on administrative forms (called *modello APR.4*) filled out and organized by the Italian Civil Registry, and provided by the Italian Institute of Statistics. The final sample consists of 11,932,720 tax residence transfers observed during the sample period. For each individual moving the tax residence in year t, the dataset lists the origin municipality of residence in year $t-1$ and the destination municipality in year t.

Using the origin and destination location of each tax residence transfer, we compute

[14] This critic is subject to two main remarks. First, the focus on top incomes remains pivotal from a cross-country tax revenue perspective, since the rich account for a large portion of the total revenue paid. In a municipality context, however, differences in the tax burden along the income distribution are less pronounced, since local income tax schedules tend to be much less progressive than national income taxes. Second, our statistics apply to within-country mobility: it remains possible that the characteristics of movers would change when looking at mobility across countries.

[15] Appendix C.2 presents additional evidence on the extent of geographical mobility in Veneto, including a map of movers (see Figure C8) and statistics on the outflow of individuals moving within the largest 10 Veneto municipalities over the period covered in the analysis (see Table C4).

the number (and share) of individuals moving in a year within each origin-destination pair of locations, for any given year. We use this number to compute the outcome of interest: the *outmigration odds-ratio*, which is the probability of an individual moving from an origin to a given destination location relative to the probability of not moving at all. To obtain enough observations across location pairs, we construct the dataset at the origin-destination province level.[16] The average number of tax residence transfers within a province pair-year cell with positive migration outflow is 127 (which drops to 49 when we exclude within-province mobility). Out of the $107 \times 107 \times 9 = 103,041$ origin $\times$ destination $\times$ year cells, 92,651 have positive migration flows. Not surprisingly, province pairs without migration flows involve sparsely populated and far away provinces. Since the outcome variable - the log odds-ratio - is undefined when the migration flow is 0, 92,651 is the number of observations used in the baseline regressions.[17]

Table C5 shows the bilateral average annual outflows among the largest 20 provinces. The table shows that most of the transfers take place within a province or across provinces within the same region. Overall, within-region transfers account for around 63 percent of the observed changes of residence. Considering only movements across places located in different regions, the province pair with the most bilateral flows was Naples-Rome, where 2,949 individuals per year transferred their residence from Naples to Rome. In contrast, 1,040 moved in the opposite direction.

Figure 4 offers prima facie evidence on whether individual mobility choices respond to geographical tax differentials. We focus on the four province pairs with the largest observed share of movers (as a share of the population in the origin location): Cosenza (origin)-Rome (destination), Caserta-Rome, Avellino-Rome, and Salerno-Rome. For each origin (o)-destination (d) location, the figure relates the log of the share of movers moving from o to d with the log of the net-of-average tax rate differential between the two locations. The figure provides suggestive evidence of tax-induced mobility across province pairs: the share of movers follows the evolution in the net-of-tax rate differential between the two locations.

3.2.4 Labor Force Survey Data

We also use the Italian Labor Force Survey (LFS), conducted by the National Institute of Statistics (ISTAT). These data represent the leading source of statistical information for

[16] We depart from constructing a dataset at the municipality pair level since it would make the analysis cumbersome: out of the potential $7,918 \times 7,917 \times 9 = 564,181,254$ triplets of origin municipality - destination municipality - year, only $11,995,190$ observations contain positive migration flows (i.e., 2.13 percent of the potential municipality pair-year cells). These municipality pairs mostly contain the largest Italian cities and many medium and large size towns located close to each other.

[17] The presence of cells with zero mobility flows might represent a bias if *systematically* associated with tax changes. We regress the probability of a missing cell on net-of-tax rate differentials, conditioning on the set of baseline controls. The estimated coefficients are not distinguishable from 0, indicating that missing cells are not systematically correlated with changes in tax differentials across pairs.

estimating the main aggregates of the Italian labor market at the national and local levels. The survey is a repeated cross-section of around 300,000 individuals interviewed each year. We access data over the 2004-2015 period and focus on individuals older than 25. The main advantage of this dataset is that each individual self-reports past and current municipality of residence and workplace. This information allows us to track the location of their workplace vis-à-vis her tax residence. Using this data, we can compute the probability of living in the same workplace municipality. The data also contain detailed demographic information, including age, civil status, education, and occupation.

In appendix Table C6, we report the labor force survey data summary statistics. Our final sample is composed of around 2.5 million individuals. The table allows us to explore commuting patterns among Italians. We find that about 58 percent of individuals do not commute to go to work. One-third of individuals work in a municipality within the same province, while only 2.5 percent of individuals commute across regions. We depict trends in the share of individuals living in the same workplace municipality in appendix Figure C9. The figure provides suggestive evidence that commuting persistently increased after 2011, when the tax decentralization reform started to create larger differences in tax rates across places. Namely, the share of workers living in the same workplace municipality dropped by around 1.8 percentage points (from 59.6 to 57.8) over the post-2012 period, compared to the 2004-2011 period.

As in transfers of tax residence data, we need to stress that we do not observe individual income. However, we can impute the income group based on the reported occupation. Following the International Standard Classification of Occupations (ISCO), we calculate both the average and marginal tax rate on personal income based on an income level equal to: i. the top income bracket for legislators, senior officials, and managers (ISCO group 1); ii. the median income for professionals, associate professionals, and technicians (ISCO groups 2 and 3); iii. the bottom income bracket for clerks, service workers, and all the other low-skill workers (ISCO groups from 4 to 8).

4 Behavioral Responses to Local Income Taxation

This section presents our main results on behavioral responses to local income taxation. In section 4.1, we provide estimates of tax base and mobility elasticities based on aggregate data. We then turn to a micro-level analysis in section 4.2.

4.1 Aggregate-Level Evidence

This section uses aggregate taxable income data (section 4.1.1) and information on transfers of residence across province pairs (section 4.1.2) to estimate tax base and mobility responses to local income taxation.

4.1.1 Overall Tax Base Elasticity

We start by estimating the aggregate tax base elasticity with respect to the net-of-local tax rate. This measure is informative about the excess burden of taxation and in predicting the revenue impact of tax changes. The tax base elasticity incorporates all the sources of behavioral responses to a tax change, and it is thus the sum of the intensive margin response, ϵ, and the extensive (mobility) margin response, η, that we conceptualized in the theoretical framework.

Identification strategy. Several identification issues challenge the empirical estimation of the tax base elasticity. In general, taxes are endogenous, since municipalities decide when (and how much) to change taxes based on several observable and unobservable factors. For instance, comparing tax base changes across municipalities may yield biased estimates if incomes are not orthogonal to the local business cycle or other local public policies. We attempt to account for these issues by leveraging tax rate changes across income brackets within a municipality. Namely, for each income bracket b, municipality i, and year t, we estimate the tax base elasticity with respect to the net-of-local tax rate in each $i - b - t$ cell. Our empirical strategy thus relates the within-income bracket variation in the tax base with the net-of-local tax rate between municipalities which changed their tax rates differently across income brackets. By exploiting tax rate variation at such a pretty granular level, we can account for several sources of endogeneity, including municipality-specific shocks that might drive the decision to change taxes.

Formally, we run regressions as the following:

$$log(y_{b,i,t}) = \beta \cdot log(1 - \tau_{b,i,t}) + \gamma_{b,i} + \delta_{i,t} + \theta_{b,l(i),t} + u_{b,i,t}, \tag{12}$$

where $y_{b,i,t}$ is the tax base, and $1 - \tau_{b,i,t}$ is the net-of-tax rate. Since our aggregate-level estimates capture a mix of extensive and intensive margin responses, we use two measures of the tax rate, $\tau_{b,i,t}$. First, we compute the bracket-specific average tax rate, calculated by taking into account the municipality-specific cutoff for tax exemption, and using the average income reported in a given income bracket-municipality-year cell. This tax measure captures the total tax burden due to local taxes that should ideally matter for migration decisions. Second, we compute the bracket-specific marginal tax rate, which is what matters for intensive margin responses.

To account for underlying income and population trends, and for confounding policy changes or shocks, we include a plethora of fixed effects. First, we include income bracket $\times$ municipality fixed effects, $\gamma_{b,i}$, to filter out permanent unobserved heterogeneity across municipalities within a given income bracket and across income brackets within a given municipality. These fixed effects allow the mobility costs to systematically differ across income brackets and municipalities. For instance, we can account for the fact that the rich in large-size cities might be more responsive to tax rate changes than the rich in a rural area, as well as for the fact that, within a specific municipality, preferences (or possibility) for tax residence relocation are not equally distributed along the income distribution. Municipality $\times$ year fixed effects, $\delta_{i,t}$, account for municipality-specific time-varying amenities or economic shocks. If a municipality becomes more attractive after a tax rate change because of policy changes correlated with the change in taxes (e.g., improvement in public amenities or increase in public spending), then these fixed effects would absorb such difference. Income bracket $\times$ local labor market $\times$ year fixed effects, $\theta_{b,l(i),t}$, control for any different reasons (including regional policies or cost of living) for why tax base or population stock at different points in the income distribution and/or in different local labor markets might experience different income or population growth rates, aside from tax changes.[18] Finally, $u_{b,i,t}$ is an error term.

Inference. In estimating standard errors, we need to account for two issues. First, the error term might be correlated over time within the panel dimension, that is the income bracket $\times$ municipality (Bertrand et al. 2004). Second, within a given income group, the error term might be correlated across municipalities because of any policy or shock directly affecting a specific income group. Likewise, within a given year, the error term might be correlated across income groups sharing the same municipality because of any common municipality-specific shocks and because the tax rate did not vary across income brackets over the period before the implementation of a progressive tax scheme. This source of bias gives rise to the classical clustering concern discussed in Moulton (1990). To account for these issues, we present standard errors that are robust to heteroskedasticity and allow for three-way clustering by municipality-income bracket, income bracket-year, and municipality-year (using the estimator proposed by Cameron et al. 2011).[19]

Extensive and intensive margin elasticity. Our parameter of interest is β: the tax base elasticity; it yields the approximate percent change in the tax base in a tax bracket, $y_{b,i,t}$, when $1 - \tau_{b,i,t}$ changes by 1 percent. The tax base elasticity incorporates all the sources of behavioral responses to a tax change, and it is thus the sum of the intensive margin response, ϵ, and the extensive (tax mobility) margin response, η. Because the two parameters ϵ and η separately enter in the optimal tax formula (see equation 11), it is necessary to decompose the total response between the intensive and extensive

[18] We follow the classification provided by the Italian Institute of Statistics (ISTAT) to assign municipalities to local labor markets. A more aggregate definition of the local labor market, such as the province or region, yields little impact in practice.

[19] This three-way clustering strategy would allow dealing with the first issue by allowing for unrestricted autocorrelation within each income bracket-municipality observations, which is the cross-sectional unit in the dataset; it accounts for the second issue by allowing for income bracket-year and municipality-year clusters.

margin, so that $\beta = \eta + \epsilon$.

We propose a simple calculation to estimate η and ϵ elasticity from the aggregate dataset. We define the *tax base elasticity*, $\beta = \eta + \epsilon$, as the elasticity of the aggregate (total) tax base in an income bracket with respect to the net-of-tax rate. The *extensive margin elasticity*, η, is calculated as the elasticity of the *population stock* with respect to the net-of-tax rate. Thus, this elasticity captures tax-induced variation in taxpayers' stock in a bracket. Finally, the *intensive margin elasticity* is computed as the change in the *average* tax base in each bracket with respect to the net-of-tax rate. Absent any substantial change in the composition of taxpayers in a bracket (and having accounted for bracket-specific income shocks), any change in the average tax base within a bracket would reflect intensive margin responses to local tax rate changes. We will discuss below the assumptions behind this decomposition exercise.

Elasticity estimates. Table 1 presents the elasticity estimates obtained from regressing equation (12). Column (1) reports the tax base elasticity, column (2) shows the population stock elasticity ("extensive margin" response), and column (3) displays the average taxable income elasticity ("intensive margin" response). Each elasticity is computed with respect to the net-of-average tax rate (first row), and the net-of-marginal tax rate (second row). Each specification controls for municipality-income class, municipality-year, and income class-local labor market-year fixed effects.

We estimate a tax base elasticity with respect to the net-of-average tax rate of 1.358. We uncover that most of the response takes place over the mobility margin: the extensive margin elasticity is 1.202, while the intensive margin elasticity is 0.156, which is not statistically significant at usual confidence intervals. A similar pattern emerges when estimating the net-of-marginal tax rate elasticity. Although we obtain slightly smaller point estimates, we cannot reject the hypothesis that the net-of-average elasticities are statistically different from the net-of-marginal tax rate elasticities.[20]

Figure 5 offers graphical evidence on the elasticity estimates. The left-hand side graph depicts the (fundamental) role of extensive margin responses; the right-hand side graph shows the (minor) impact of intensive margin responses. The figure presents bin scatter-plots of the log of total tax base (both graphs), log of population stock (left-hand side graph), and log of income per capita (right-hand side graph) on the log of the net-of-average tax rate (both graphs). We depict the residuals obtained by regressing each variable on the set of fixed effects described in equation (12). We then plot

[20]When comparing the size of our elasticity estimate with the existing taxable income (Saez et al. 2012) and mobility literature (Kleven et al. 2020), it should be noted that the size of the elasticity crucially depends on the size of the jurisdiction (Kanbur and Keen 1993). As municipalities are small open economies located next to each other, relocation costs are likely negligible, and elasticity estimates are larger than those estimated from larger jurisdictions, such as countries or states. In fact, the elasticity becomes infinite in the extreme case of very small jurisdictions. By contrast, large jurisdictions present lower elasticities as it is costly to relocate (and in the extreme case of the full world, the migration elasticity is naturally zero).

the residuals in 25 equal-sized bins and show the line of best fit, corresponding to the β estimate obtained from regressing equation (12). The left-hand side shows that the two slopes are fairly similar, thus suggesting that the extensive margin elasticity is close to the total tax base elasticity. The right-hand side graph shows that the slope for the intensive margin response is flat (and not statistically significant). This figure thus provides a graphical validation that the tax base elasticity reflects mobility responses.

Identifying assumptions and robustness checks. Our identification strategy rests on within-municipality local tax rate changes across income brackets. The introduction of a graduated tax schedule at the municipality level is what allows us to identify the tax base elasticity by exploiting variation in tax rates across brackets within a municipality. Although our setting allows us to control for many potential identification concerns, there are two remaining sources of endogeneity. First, implementing a graduated tax schedule should be considered as good as random. Second, endogeneity could arise from taxes being increased when a municipality expects incomes to grow more, particularly in such a way as to generate divergence in income growth across brackets within a municipality.

In the online appendix D, we scrutinize the validity of our estimates by presenting additional empirical exercises. We perform an event-study research design that leverages cross-municipality variation in the timing of graduated tax scheme implementation. We show that income and mobility trends were evolving in a parallel fashion over the years leading to the implementation of a graduated tax scheme. Then, we observe a gradual and persistent drop in the tax base (see Appendix Figure D1-Figure D5). This assuages concerns related to the possibility that our estimates capture some preexisting trends across municipalities or income classes.[21]

We also test the robustness of our findings to different choices of standard error clustering. Following the suggestions by Angrist and Pischke (2009), we cluster the standard errors on different clustering levels, including municipality, municipality-income class, and income class-LLM-year. Figure D6 shows that our tax base and extensive margin elasticity estimates remain statistically significant at usual confidence intervals when we employ standard errors clustered at a different level.

Finally, we discuss the two main assumptions behind our simple decomposition of intensive and extensive margin responses. First, although secular trends in income dynamics are captured by the income bracket $\times$ local labor market $\times$ year fixed effects, within-municipality cross-income class fluctuations that are correlated with tax rate changes would lead to a bias in the observed extensive margin response. As long as these fluctuations reflect behavioral responses to tax changes, such as bunching responses or labor supply and reported income adjustments, they would reflect a reaction over the intensive rather than extensive margin. These responses would lead to an

[21] See also the previous working paper of this study (Rubolino 2020) for additional empirical analyses.

upward (downward) bias in the extensive (intensive) margin response, but would not affect the overall tax base elasticity. We assess the scope of cross-income class fluctuations in Appendix Table A1, where we use micro-level data to create a transition matrix calculating the probability of moving from one bracket to another. The table provides reassuring evidence that cross-bracket fluctuations only affect a fairly small portion of taxpayers.[22] We will further test the credibility of our extensive margin estimates in section 4.1.2, where we will estimate mobility responses directly from the transfers of residence data.

Second, the intensive margin elasticity is calculated assuming that mobility responses would not affect income per capita observed in a given bracket. One threat to this assumption is selection: if cross-municipality movers report income that is significantly different from the average income in the municipality of destination bracket, then average income changes observed in a bracket would reflect selection, rather than intensive margin responses. In other words, what we interpret as an intensive margin response might actually reflect a change in the average income within a bracket due to a selection of "incoming" taxpayers (including both cross-municipality and cross-bracket movers) that are systematically different than the median taxpayer in that bracket. Since the number of incoming taxpayers in an income class-municipality cell is small, and the average cell size in our data is relatively large (839 observations), we believe this issue to be relatively minor.

4.1.2 Estimating Mobility Responses from Transfer of Residence Data

Our extensive margin elasticity based on the population stock in an income class might also capture labor supply responses or taxable income adjustments. As discussed above, both taxpayers' mobility across brackets and movements in/out of the labor force might be captured as extensive margin responses if correlated with tax rate changes. In this section, we attempt to estimate a net-of-tax rate mobility response that is not sensitive to these issues.

Identification strategy. We use the transfers of tax residence data to conduct a *location pair analysis* across Italian provinces. Following Moretti and Wilson (2017) and Agrawal and Foremny (2019), we relate taxpayers' flow within a given origin-destination location with the net-of-tax rate differential within the same location pair. We first compute the outmigration odds-ratio relative to each pair of provinces in Italy and for every year. Then, we relate changes in transfers of tax residence across province pairs with changes in the net-of-tax rate differential between the two provinces. For-

[22] Behavioral responses likely depend on whether tax changes are perceived as permanent or temporary. Assuming taxpayers are more likely to perceive tax changes as temporary when they observe many year-to-year changes, we test whether the elasticity estimate is relatively lower in income class-municipality cells where we observe tax changes more frequently. Table A2 provides no statistically significant evidence of attenuated responses in contexts where taxes change more often.

mally, we run regressions as the following:

$$log(P_{o,d,t}/P_{o,o,t}) = \beta \cdot log[(1-\tau_{d,t})/(1-\tau_{o,t})] + \gamma_{o,d} + \delta_t + u_{o,d,t}, \quad (13)$$

where $P_{o,d,t}/P_{o,o,t}$ is the population share that moves from an origin province o to a destination province d, $P_{o,d,t}$, relative to the population share in o that does not move, $P_{o,o,t}$. $log[(1-\tau_{d,t})/(1-\tau_{o,t})]$ is the net-of-average tax rate differential within the province pair considered. Since we do not observe movers' income in this analysis, we compute the net-of-average tax rate defined at the median income level of the pre-tax national distribution.[23] The parameter of interest is β, which computes the mobility elasticity with respect to the net-of-tax rate differential across location pairs.[24] Differently from the extensive margin elasticity estimated from equation (12), this mobility elasticity essentially captures mobility responses across locations.

In alternative specifications, we also include origin or destination province × year fixed effects or origin-destination time trends to account for non-tax related factors driving mobility and any time-varying shocks in an origin or destination location. We will also control for the differential in local public spending and property tax rates (on both the main residence and second homes) to account for any change that might ameliorate amenities or might make a location more attractive. $\gamma_{o,d}$ are province pair fixed effects, which capture the cost of moving for each province pair and differences in amenities within the province pair. Moreover, these fixed effects capture any time-invariant policy of the provinces or secular patterns in migration across provinces. For example, suppose individuals tend to move from one origin province located in the South of Italy to cities in the North of Italy because the latter has higher labor demand. In that case, province pair effects will account for these factors as long as they are permanent. In estimating standard errors, we follow Moretti and Wilson (2017) to allow for three-way clustering by origin × year, destination × year, and origin-destination pair.

Results and elasticity estimate. Figure 6 presents the main results as a series of bin scatter-plots of the log of outmigration odds-ratio on the log of net-of-tax rate differential. We start by presenting the impact of local taxation on the probability of changing the tax residence after conditioning on province-pair fixed effects. In other words, we depict the slope estimated by regressing the log of the odds-ratio and net-of-tax rate differential demeaned by the province pairs dummies. Then, we cumulatively

[23] In the online appendix D.4, we also report elasticity estimates obtained from regressing equation (13) on the *stock* of movers (see Table D4), and we use the *marginal* tax rate differential as alternative tax rate (see Table D5 and Table D6). We find similar estimates.

[24] The resulting average elasticity of the probability of moving with respect to the net-of-tax rate will be equal to $E[dlog(P_{o,d,t})/dlog(1-\tau_{o,t})] = \beta(1-P)$, where P is the weighted average of $P_{o,d,t}$ observations (where each combination is weighted by the number of individuals in that observation cell). As in the sample $P < 0.001$, the elasticity is close to β.

add year fixed effects and pair-specific time trends, the differential in spending and property taxes, origin or destination province-year fixed effects, and region pair-year fixed effects. All the graphs depict a positive relationship between the probability of changing the tax residence and the net-of-tax rate differential. This suggests that higher destination-origin net-of-tax rate differentials are associated with higher origin-to-destination transfers of tax residence.

The figure also displays the β estimates and standard errors. Each elasticity estimate is positive and statistically significant at conventional levels (see also appendix Table D3 for a summary of these estimates). Our baseline elasticity, which absorbs year fixed effects, location pairs fixed effects, and pair-specific trends (panel B), is 2.2. Given that the average number of transfers of tax residence within a location pair is 49, our most conservative estimate suggests that a 1 percent increase in the net-of-tax differential would induce around one extra taxpayer, on average, to transfer the tax residence within a province pair.

When comparing the cross-location mobility elasticity with the population *stock* elasticity (previously shown in Table 1), it is natural that the former is larger because the base (that is, the number of individuals who move each year within a province pair) is smaller. The elasticity estimate is in line with the existing evidence on *within-country* migration in countries applying the residence-based tax (see, e.g., Agrawal and Foremny (2019) for Spanish regions; Martínez (2022) for Swiss cantons). As stressed previously, the fact that these elasticities are larger than *cross-country* migration elasticity estimates (see, e.g., Kleven et al. 2013; Akcigit et al. 2016) reflects the negative relationship between mobility elasticity and jurisdiction size (Kanbur and Keen 1993).

Location pair analysis using municipality and income bracket pairs. The location pair analysis presents a drawback: since we do not observe movers' income, the tax rate is subject to measurement errors. We tackle this issue by proposing a location pair analysis that relates the outmigration odds-ratio with the net-of-tax rate differential across locations *and income bracket pairs*. We perform this analysis using Veneto's micro-level tax returns dataset, allowing us to observe individual-level changes in the municipality of residence and movers' income information. Although this dataset allows us only to uncover within-region tax-induced mobility responses, we believe this analysis offers three advantages compared to our baseline location pair analysis. First, we can leverage more granular variation in location choices (municipality and income bracket pairs instead of province pairs). Second, we can exploit variation in the income tax rate differential along the full income distribution. Third, we can account for unobserved heterogeneity, confounding policy, and/or shocks at a much granular level.[25]

[25]A municipality pair analysis could also be performed over the universe of Italian municipalities. In practice, this analysis is cumbersome for two reasons. First, it is complicated for computational rea-

We present the results of this analysis in Appendix D.5. The municipality and income bracket pairs analysis allows us to account for origin municipality × destination municipality × income bracket fixed effects, which control not only for unobserved differences in the cost of moving and amenities within each municipality pair, but also allow these differences to vary along the income distribution arbitrarily. Our preferred specification yields a precisely estimated elasticity of 0.613 (see column (1) in Appendix Table D7). Finally, this elasticity estimate remains somewhat similar when accounting for shocks at the origin or destination municipalities.

Summary. To summarize, the aggregate-level analysis yields two main takeaway results. First, we estimate a tax base elasticity of 1.358, mostly reflecting extensive margin responses. Second, local tax rate differentials across places significantly affect the location choice of individuals. We find that, on average, a 1 percent increase in the net-of-tax rate differential between place A and B increases the probability of moving from A to B by around 2.2 percent.

4.2 Micro-Level Evidence

This section provides elasticity estimates based on the micro-level dataset from the Veneto region. Using these data, the behavioral responses to local taxes from non-movers can be separated from the impact on the decision to move out of a municipality. The main empirical advantage of this analysis is that we can follow taxpayers over time and across places to infer intensive and extensive margin elasticity (section 4.2.1 and 4.2.2). This analysis also allows us to account for unobserved individual-level heterogeneity. As emphasized in Kleven et al. (2020), the impact of tax rate differentials across locations is likely to be heterogeneous and correlated with various factors, such as the size of the tax base and preferences for amenities and/or local public goods. While the aggregate analyses account for these factors as long as they do not systematically vary within a given income class-municipality cell, the micro-level analysis allows us to account for heterogeneous effects at the individual level. We can also use these data to study the slope of the mobility elasticity, and heterogeneous responses with respect to individual characteristics such as gender, marital status, and age (section 4.2.3).

4.2.1 Intensive Margin Elasticity

We start by estimating intensive margin responses to local income tax rate changes on the sample of non-movers, defined as those that did not change their municipality of residence over the period covered in our data. Our final sample is composed of 3.3 million taxpayers and around 19.5 million observations, which account for 74.1% of

sons: we would need to compute 7,918 × 7,917 × 9 = 564,181,254 triplets of origin municipality-destination municipality-year cells. Second, we would observe non-zero values in only a small share of cells.

our original full sample.[26]

To identify the taxable income elasticity, we depart in two ways from the specification presented in equation (12). First, we define the taxable income and the net-of-marginal tax rate at the individual level (rather than at the municipality-income class level). Second, we account for the fact that individual-level taxable income changes might be more sensitive to mean reversion, thus leading to measurement errors in the construction of the net-of-tax rate. Although it is unclear whether the measurement error is classical, this could bias the OLS coefficients downwards. To address this issue, we follow the previous literature (see, e.g., Gruber and Saez 2002) to instrument the net-of-tax rate by the simulated net-of-tax rate: the net-of-tax rate at t based on the income reported at time $t-1$. Such an instrument has the advantage of only using *statutory* variation in the marginal tax rate across tax brackets and municipalities.[27] Using the predicted instrument implies that we miss the first (individual-specific) year in our sample, reducing our sample to around 16.4 million observations.

Table 2 reports the taxable income elasticity, computed by regressing the log of taxable income on the log of the net-of-marginal tax rate. Columns 1, 3, and 5 report the OLS estimates, while columns 2, 4, and 6 display the 2SLS estimates computed using the log of the instrumented net-of-marginal tax rate. We start with a specification that includes individual fixed effects and income class $\times$ year fixed effects. These fixed effects account for individual time-invariant characteristics and other contemporaneous policy variations and economic circumstances that might differently affect taxpayers at different points of the income distribution. We also interact the individual fixed effects with declaration type fixed effects (i.e., self-employed, dependent worker, retiree) to account for changes in the type of tax return filed that might be correlated with salient within-individual income changes (i.e., early retirement, switching from dependent to self-employed work).[28] We estimate an elasticity of 0.095, which is imprecisely estimated. Reassuringly, the point estimate appears fairly close to the intensive margin elasticity estimate calculated from the aggregate-level analysis (see Table 1).

We then account for income class $\times$ declaration type fixed effects (columns 3 and 4). These fixed effects account for shocks or other policies that might differently affect taxpayers by income class, individual characteristics, and/or declaration type (e.g.,

[26] As long as movers are those who are more sensitive to tax changes, our intensive margin elasticity estimate should be interpreted as a lower bound on the intensive margin elasticity that would have been estimated in a more closed system, such as at the national level where migration costs are higher.

[27] Following Saez et al. (2012), we estimate the predicted marginal tax rate in year t by inflating year $t-1$ incomes using a municipality-specific inflation adjustment. As a result, only within-municipality cross-bracket statutory tax rate changes can produce a change in the predicted net-of-tax rate. Weber (2014) suggests calculating the instrument as a function of income lagged one or more years before the base year (where the appropriate lag depends on the degree of serial correlation of transitory income). Our estimates are not sensitive to the lag dimension's choice.

[28] These fixed effects also account for the fact that self-employment income is taxed at a different rate in Italy (see Di Marzio et al. 2023).

the fact that high-income self-employees might be more responsive to tax changes). We obtain a 2SLS elasticity estimate of 0.33, which is again not statistically significant.

Finally, we account for individual-specific characteristics (gender, age group, and marital status) $\times$ year fixed effects (columns 5 and 6). These fixed effects account for shocks or other policies that might affect taxpayers differently according to their demographic characteristics (e.g., the tax system might affect married taxpayers differently). The 2SLS elasticity estimate reduces to 0.293 and is not statistically significant at usual confidence intervals.

Two main remarks emerge from this analysis. First, the micro-level intensive margin elasticity estimate is similar to the aggregate analysis estimate. In both cases, we compute a small and imprecisely estimated elasticity (0.293 from the micro-level analysis; 0.156 from the aggregate-level analysis). This suggests that, on average, intensive margin responses to local income tax changes are relatively small. Second, the elasticity estimate is consistent with the existing estimates, which are mainly based on country-level tax rate changes (see Saez et al. (2012) for a survey based on a range of empirical studies; Rubolino and Waldenström (2019) for the only existing taxable income elasticity estimate based on (aggregate) Italian data).

4.2.2 Extensive Margin Elasticity

This section presents the extensive margin elasticity. In this analysis, our outcome variable of interest is defined by a dummy variable equal to 1 if an individual changes municipality in year t ("move" event); 0 otherwise. The conceptual framework emphasizes that a taxpayer would move if the utility gain of moving offsets the mobility cost. Our empirical strategy accounts for this feature by allowing the mobility costs to systematically differ across individuals (through the individual fixed effects). This allows us to address a concern emphasized by Borjas (1999) that "the migration costs probably vary among persons [but] the sign of the correlation between costs and (skills) is ambiguous." We also account for any shock or policies that might have differently changed the mobility costs along the income distribution (by accounting for income bin-year fixed effects), and by gender, age groups, and marital status (by interacting each of these variables with the year fixed effects).

To construct the (net-of-)tax rate used to estimate mobility responses, the key empirical challenge is correctly measuring the tax incentive affecting the decision to move across places. As discussed in the conceptual framework, a taxpayer would make choices based on the *average* tax rate that she would pay in her current place, with respect to the average tax rate that she would pay in the case of moving to another place. We thus compute the tax incentive associated with moving as the net-of-average tax rate differential between the net-of-average tax rate of all the other potential destination municipalities and the net-of-tax rate in the current municipality of residence. In this case, estimating the elasticity of migration with respect to the net-of-tax rate differential relies on measuring the *relative* change in the tax incentive of moving. This model allows us to uncover the reduced-form estimate of the mobility elasticity by making the mobility decision a function of the utility comparison between municipalities.[29]

We estimate the extensive margin elasticity using a linear probability model, where the "move" event is regressed on the log of the net-of-tax rate differential.[30] Table 3 presents both OLS and 2SLS regression estimates, obtained by instrumenting the net-of-tax rate by the simulated net-of-tax rate. We use the same set of fixed effects presented in section 4.2 for comparability with the intensive margin estimates.

Our preferred specification (column 6) yields a precisely estimated mobility elasticity of 0.959. The elasticity estimate is remarkably stable across specifications. In Appendix Table A3, we test the robustness of our estimate to the inclusion of additional controls, such as municipality-year fixed effects. The coefficient estimate remains substantially similar. Overall, the micro-level evidence confirms the results emerging from the aggregate analysis: the observed response to local income taxation mostly reflects a mobility response.[31]

4.2.3 Heterogeneous Responses

This section presents heterogeneous responses to local income taxation. We focus on two main sources of heterogeneity. First, we study whether responses vary along the income distribution. As discussed in the conceptual framework, empirical evidence is needed on both the level and the slope of the migration elasticity to derive the shape of optimal marginal tax rates. Second, we investigate whether responses to taxes vary with respect to socio-demographic characteristics and municipality-specific aspects.

Heterogeneity along the income distribution. To estimate heterogeneous responses along the income distribution, we estimate extensive margin and intensive margin elasticities by interacting the net-of-tax rate with a dummy for each income bracket where a different marginal tax rate can be applied: i. $<$ 15,000 euros; ii. 15,000-28,000 euros; iii. 28,000-55,000 euros; iv. 55,000-75,000 euros; v. $>$ 75,000 euros.

[29] An alternative strategy to estimate mobility responses would be to run a location choice model (see, e.g., Kleven et al. 2013, Akcigit et al. 2016, and Agrawal and Foremny 2019). However, a location choice model is computationally difficult in our set-up: we would have a dataset of 4.2 million individuals $\times$ 563 municipalities $\times$ 8 years = 18.9 billion observations. Coupled with the required set of fixed effects, it is arguably cumbersome to implement this empirical approach.

[30] Note that taking the log of the net-of-tax rate differential implies that we exclude (a small portion of) taxpayers with a net-of-tax rate differential equal to 0.

[31] In relating the micro-level mobility elasticity with the aggregate-level estimate, one needs to consider that our micro-level estimates only capture within-region mobility, while the aggregate estimates are a mix of within and across regions responses. The existing literature has shown that within-tax jurisdiction mobility responses are stronger (e.g., Akcigit et al. (2022) estimate a within-state mobility elasticity of 0.11 for US inventors, which is smaller than their 1.23 across-state elasticity estimate). Our finding of a relatively smaller elasticity from the micro-level analysis corroborates this pattern of mobility responses.

The left-hand side graphs of Figure 7 plot the coefficient estimate from the interaction term (where the baseline group is the first income bracket). It thus plots how much larger (or smaller) is the elasticity estimate in each income bracket with respect to the baseline income bracket. Panel A depicts the intensive margin elasticity; panel C the extensive margin elasticity. For each graph, we report estimates computed over the full sample (2007-2014; in black), and for the post-decentralization period exclusively (2012-2014; in blue), when larger tax differentials across places emerged.

The figure documents a marked income gradient of increasing tax responsiveness. This is observed both for the intensive and extensive margin response over the post-2012 period, when geographical tax differences emerged. The extensive margin elasticity in the top income group (above 75,000 euros) is around two times larger than the one for the bottom income group (below 15,000 euros). A similar pattern emerges for the intensive margin response, where the elasticity at the top is around 2.1 times larger than at the bottom. By contrast (and unsurprisingly), the income gradient in the *extensive* margin responsiveness was absent over the full period, since the small pre-2012 tax rate differences across places dampened the overall mobility response. The pre-2012 gradient in the *intensive* margin response is instead visible over the pre-2012 period, since there were within-place tax rate changes that might have driven intensive margin responses.[32]

While heterogeneity in the intensive margin response has been previously documented (see Saez et al. 2012), we are the first to document the slope of the mobility elasticity (to our knowledge). This heterogeneity is informative for (local) policymakers in determining the shape of optimal marginal tax rates and the revenue implications of changing the progressivity of the (local) tax schedule. We will discuss the tax policy implications of this finding in section 5.

Heterogeneity by socio-demographic characteristics. In panels B and D of Figure 7, we explore heterogeneous effects depending on individual socio-demographic aspects and municipality characteristics. We interact the net-of-tax rate with several indicator variables, and we plot the coefficient estimate from the interaction term, and both 90 and 95 percent confidence intervals. The graphs show that several individual and municipal characteristics affect the intensive and extensive margin response.

Focusing first on intensive margin responses, we estimate a stronger average effect from women, married individuals, homeowners, and older individuals (those with age above the median). The heterogeneous impact by gender is consistent with studies showing that the labor supply elasticity of women (and, in particular, married women) tends to be larger than men (see Keane 2011). Instead, we do not find significant het-

[32]The fact that the income gradient in the intensive margin response is less marked over the post-2012 period might reflect selection: taxpayers that are more responsive to taxes (and thus have larger elasticities) moved after 2012. Since our intensive margin elasticity applies to "non-movers", the elasticity (and the gradient) is lower over the period with higher mobility responses.

erogeneous responses with respect to the level of per-capita spending in a municipality (captured by a dummy for municipalities with per-capita spending above the median, as reported in municipal balance sheets data).

We also find heterogeneity over the extensive margin. Mobility responses to tax rates appear to be dampened among married individuals, older individuals, homeowners, and individuals living in municipalities with higher spending per capita. The lower responses from married and older individuals as well as homeowners can be explained by the higher mobility costs and other migration-related frictions that these individuals would face. Our finding that mobility responses to taxes are lower in high-spending municipalities suggests that individuals with stronger preferences for locally provided public goods are considerably less mobile (see, e.g., Liebig et al. 2007; Brülhart et al. 2020). By contrast, we do not detect any significant heterogeneous effect by gender.

4.2.4 Does the Mobility Response Reflect Work-Related Migration?

Does mobility reflect a change in the (tax) residence, or is it a real (i.e., job-related) change? So far, our empirical exercises have been silent on the nature of the mobility response. Tax returns and transfers of tax residence data do not allow us to disentangle a real from a fraudulent move, where a taxpayer changes the tax residence to a second home without physically moving. Distinguishing between a labor market-driven response from a simple change in the home address does not matter under a municipality-specific tax revenue perspective, but it is crucial in terms of welfare conclusions and policy recommendations (see, e.g., Chetty 2009 and Slemrod 2010).

Location pair analysis for workplace location. To provide suggestive evidence on the nature of the mobility response, we use labor force survey data to examine whether the extensive margin response reflects a change in the municipality of the workplace. We conduct a location pair analysis (as in section 4.1.2), where we regress the outmigration odds-ratio relative to workplace changes for each province pair on the net-of-tax rate differential, conditional on the same set of fixed effects presented in equation (13). Appendix Table D9 displays the coefficient estimate. We estimate a positive effect of net-of-tax rate differentials on the outmigration odds-ratio, although we are unable to uncover any statistically significant estimate. Even in the least conservative scenario, our elasticity estimate is lower than the elasticity estimated from transfers of tax residence data (although the average number of observations in the origin province-destination province-year cell is always smaller in labor force survey data). This result suggests that the mobility responses to tax changes only partially involved work-related mobility.[33]

[33] A well-known criticism is that survey data are hardly reliable when analyzing the richest individuals, given that their response rates are plummeting. If the rich are under-sampled and their mobility

Do tax differentials affect job commuting? The fact that the migration response only partially reflected a change in the workplace would suggest a separation of the place of residence from the workplace. To what extent taxes affects the probability of living close to the workplace?[34] To study the impact of tax differentials on commuting, we estimate how the probability of living in the same municipality as the workplace varies with respect to the log of net-of-tax rate differential. The latter is computed as the log difference between the net-of-average tax rate of the current municipality of residence and the net-of-average tax rate of all the potential "competitor" municipalities in the same region. We then run OLS regressions in the spirit of the cross-bracket analysis presented in equation (12).[35] In this analysis, we replace the income bracket (which is not observed in the labor force survey) with dummies for each occupation group. Hence, we can still exploit changes in the tax rate differentials across individuals within a municipality by leveraging cross-occupation variation (instead of cross-bracket) in the predicted income group (and, thus, in the local tax rates).

We present the results in Table 4, where we report the coefficient estimate from regressing a dummy equal to 1 if an individual lives in the same municipality of the workplace (i.e., not being a commuter) on the net-of-average tax rate differential. We start with a model that accounts for municipality-occupation group, municipality-year, and year-occupation group fixed effects (column 1). Following the discussion presented in section 4.1, we present three-way clustered standard errors by municipality-year, year-occupation group, and occupation group-municipality, which yield more conservative estimates compared to two-way clustering or by just clustering at the municipality level. We obtain a coefficient estimate of 1.982, which is statistically significant at usual confidence intervals. This estimate suggests that a 1 percent increase in the net-of-average tax rate differential raises the probability of living in the same municipality as the workplace (i.e., not commuting) by around two percentage points. Given an average probability of not commuting for work by 58.2 percent, our estimate suggests that a 1 percent increase in the net-of-tax rate differential would lead to a rise of 3.4 percent in the probability of working in the same municipality of residence. Therefore, individuals seem more likely to live closer to their workplace when it is more convenient from a tax perspective. Put in another way, commuting is more likely when the municipality where the workplace is located sets a relatively higher tax rate.

In columns (2)-(4), we test the robustness of this estimate to account for several

response to taxes is larger, then we would yield downward biased estimates.

[34] A small literature has studied the impact of tax policies on commuting and the spatial structure of cities (see, e.g., Wildasin 1985 and Schmidheiny 2006). Focusing on the impact of taxes on commuting by exploiting the discontinuous change in the tax system at geographic borders in the US, Agrawal and Hoyt (2018) show that the effect of taxes on commuting times is a sufficient statistic for measuring the spatial welfare cost associated with tax differentials across places.

[35] Since our sample is a repeated cross-section of individuals, we are less worried by mean reversion issues in this context. We thus do not implement a 2SLS model.

individual-level controls (gender, age and its square, educational attainment, and civil status), year-occupation-region fixed effects, and the interaction between the individual controls and year fixed effects. These controls account for any potential shock or policy that might have affected individuals differently based on their occupation (even within a region) or their socio-economic and demographic characteristics. Our estimates remain substantially similar.

Our finding suggests that tax differentials across municipalities significantly affect commuting. Although the nature of the data does not allow us to run a fully-fledged analysis on the impact of taxes on commuting, our result provides suggestive evidence that tax differentials across places affect commuting. These findings align with studies suggesting that individuals are willing to accept longer commute times in return for lower income tax rates (see, e.g., Agrawal and Hoyt 2018).

5 Policy Implications

This section discusses the implications of our findings for local governments' tax policies. Our study can be informative for policymakers in countries where sub-national jurisdictions, such as states, regions, and municipalities, have the power to set their tax rates. Our findings suggest that migration responses to local tax differentials can constrain the ability of local governments to impose higher taxes. This issue is at the core of the literature on fiscal federalism initiated by Oates (1972). The received wisdom from this literature is that small jurisdictions, such as municipalities, should be constrained in terms of tax policy because their tax base is highly elastic. As a result, local governments face a fundamental trade-off between the inefficiencies from tax competitions and the inability to tailor public goods provision according to their residents' preferences. To inform policymakers on the extent of this trade-off, our estimates can help examine the revenue costs of higher local tax rates.

Following Piketty and Saez (2013) and Agrawal and Foremny (2019), we first use our elasticity estimates to forecast how the behavioral responses to local taxes affect tax revenue collected by municipalities.[36] Maintaining the assumptions and notation presented in section 2, we consider a nonlinear tax schedule $T(y_i)$ where individual i reports income y_i. We assume that there are N_b taxpayers in each bracket b, which face a constant marginal tax rate τ_b for income above y_b^*.

If a municipality increases the tax rate in a bracket by a small amount $d\tau_b$, there are three effects to consider. First, there is a mechanical increase in revenue by $N_b(y_b - y_b^*)d\tau_b$, where y_b is the average income in the bracket. Second, mobility responses reduce the tax base in the bracket by $\eta N_b(y_b - y_b^*)T(y_b)/[1 - T(y_b)]d\tau_b$, where η is the

[36] This analysis diverges from Agrawal and Foremny (2019) in two ways. First, the intensive margin effects are estimated rather than calibrated. Second, we estimate the revenue losses at different points of the income distribution.

mobility elasticity. Third, intensive margin responses reduce the tax base by $\epsilon N_b(y_b - y_b^*)\alpha_b\tau_b/(1-\tau_b)d\tau_b$, where ϵ is the intensive margin elasticity, and $\alpha_b = y_b/(y_b - y_b^*)$ is the Pareto parameter.

Therefore, the total change in tax revenue is equal to:

$$dR_b = \underbrace{N_b(y_b - y_b^*)d\tau_b}_{\text{mechanical effect}} - \underbrace{\eta N_b(y_b - y_b^*)T(y_b)/[1-T(y_b)]d\tau_b}_{\text{extensive margin effect}} - \underbrace{\epsilon N_b(y_b - y_b^*)\alpha_b\tau_b/(1-\tau_b)d\tau_b}_{\text{intensive margin effect}}. \tag{14}$$

Equation (14) shows that the fraction of tax revenue lost through behavioral responses is an increasing function of the tax rate, the two elasticities, and the Pareto parameter. This analysis presents several caveats. In particular, we assume that behavioral responses to a tax rate change in a given bracket do not spill over to other tax brackets. We also neglect other sources of externality, such as a contemporary change in other tax instruments or geographical externalities.

We first study the aggregate revenue effect. We thus ignore, for now, differences in behavioral responses and tax rates across the income distribution. We build from the elasticity estimates that we derive from the aggregate analysis (column (2) and (3) of Table 1 for the extensive and intensive margin elasticity, respectively), and we take the tax rates and the Pareto parameter directly from our data.

The top panel in Figure 8 depicts the trend in the portion of revenue losses due to extensive margin responses (blue solid line) and intensive margin responses (red dashed line). The figure shows that the fraction of revenue losses due to behavioral responses is relatively small. On average, we find that extensive and intensive margin responses would reduce revenue by 12.9 and 1 percent, respectively, in 2015, which is the year with the largest fraction of revenue losses. This estimate suggests the mechanical effect of higher or lower tax rates largely dominates the behavioral effects. This implies that Italian municipalities are on the left side of the Laffer curve. The upward trend in the fraction of revenue losses is consistent with the increasing local tax rates.

We then explore how the fraction of revenue losses varies along the income distribution. We apply equation (14) to each income bracket, and we take the bracket-specific elasticity estimates presented in the heterogeneity analysis (section 4.2.3). The bottom panel of Figure 8 depicts the fraction of revenue losses from each income bracket and year. Consistent with the evidence presented in section 4.2.3, we find a marked gradient in the fraction of revenue losses due to behavioral responses. In 2015, we find that behavioral responses from taxpayers in the top income bracket (income above 75,000 euros) reduced tax revenue by around 43 percent. This figure decreases to 24 percent for the bracket just below (income between 55,000 and 75,000 euros). The fraction of revenue losses is negligible (lower than 1 percent) for the bottom bracket (income below 15,000 euros) and the bracket just above (income between 15,000 and 28,000 euros).

These analyses have relevant policy implications for local tax policy. We show that the revenue losses due to behavioral responses do not offset the mechanical increase in revenue due to local taxes. Although top incomes appear to be much more responsive to local tax differences than medium and low incomes, we find that the mechanical effect of higher taxes largely dominates the behavioral effects in each income tax bracket. With the caveats discussed above in mind, these estimates suggest that Italian municipalities are on the left-side of the Laffer curve.

6 Conclusions

This paper addresses one of the most long-standing questions in public economics: do individuals move across places in response to tax differences? The answer to this question has crucial implications for policymakers, encompassing the resulting changes in expected tax revenue and the level and location of local economic activity. Despite a growing literature has focused on tax-induced mobility response of individuals, a recent survey of the literature (Kleven et al., 2020) has emphasized that "direct empirical evidence on the responsiveness of individual locations to taxes has been remarkably scant". In particular, most of the existing literature has focused on specific segments of the population that might be substantially sensitive to taxes.

We combine several administrative data to study behavioral responses to local income taxation over the entire income distribution. Our laboratory is Italy, which offers both temporal and spatial variation in the local income tax rate. The tax rate was substantially similar across places in the early 2000s. Following a series of recent tax decentralization reforms, which granted more autonomy to local governments in setting taxes, larger dispersion in the local income tax rate has emerged both across places for a given income group and across income groups for a given place. This policy change gives a unique opportunity to study how taxation affects location choices in a country where income taxes are purely residence-based and several local public goods, such as education and public healthcare, are exclusively provided to their residents.

We find that local income tax changes affect the location of the tax base and the probability of changing tax residence. Our preferred model shows that a 1 percent increase in the net-of-local income tax rate raises the tax base by around 1.4 percent. This estimate mainly reflects mobility responses. Relating changes in transfers of tax residence with changes in the local income tax rate differential across places, we provide evidence that taxpayers actively move their tax residence across places to minimize their tax liability. On average, a 1 percent increase in the net-of-tax rate differential raises tax residence transfers by around 2.2 percent. We document a marked gradient of increasing tax responsiveness along the income distribution: the mobility response in the top tax bracket (above 75,000 euros) is around two times larger than the response for the bottom tax bracket (below 15,000 euros).

In the last part of the paper, we study the revenue costs of local income taxation. Although migration is an often-cited justification in proposals to avoid tax progressivity at the local level, we find that the benefit of additional revenue from increasing local taxes greatly exceeds the cost of foregone revenue due to mobility. Our results are consistent with Epple and Romer (1991) and Agrawal and Foremny (2019), who show that local redistribution is feasible with migration, but in contrast with the analysis in Feldstein and Wrobel (1998), who show that local redistribution involves large efficiency costs.

References

Agrawal, D. R. and Foremny, D. (2019). Relocation of the Rich: Migration in Response to Top Tax Rate Changes from Spanish Reforms. *The Review of Economics and Statistics*, 101(2):214–232. 1, 4, 20, 22, 26, 30, 33

Agrawal, D. R., Foremny, D., and Martínez-Toledano, C. (2023). Wealth Tax Mobility and Tax Coordination. *Unpublished manuscript.* 4

Agrawal, D. R. and Hoyt, W. H. (2018). Commuting and Taxes: Theory, Empirics and Welfare Implications. *The Economic Journal*, 128(616):2969–3007. 2, 3, 29, 30

Akcigit, U., Baslandze, S., and Stantcheva, S. (2016). Taxation and the International Mobility of Inventors. *American Economic Review*, 106(10):2930–2981. 4, 22, 26

Akcigit, U., Grigsby, J., Nicholas, T., and Stantcheva, S. (2022). Taxation and Innovation in the Twentieth Century. *The Quarterly Journal of Economics*, 137(1):329–385. 1, 4, 26

Angrist, J. D. and Pischke, J.-S. (2009). *Mostly Harmless Econometrics: An Empiricist's Companion*. Princeton University Press, Princeton, NJ. 19

Bertrand, M., Duflo, E., and Mullainathan, S. (2004). How Much Should We Trust Differences-In-Differences Estimates? *The Quarterly Journal of Economics*, 119(1):249–275. 17

Boeri, T., Ichino, A., Moretti, E., and Posch, J. (2021). Wages Equalization and Regional Misallocation: Evidence from Italian and German Provinces. *Journal of the European Economic Association*, 19(6):3249–3292. 1, 11

Borjas, G. J. (1999). The Economic Analysis of Immigration. In *Handbook of Labor Economics*, volume 3, pages 1697–1760. Elsevier B.V. 25

Brülhart, M., Danton, J., Parchet, R., and Schläpfer, J. (2020). Who Bears the Burden of Local Taxes? *Unpublished manuscript.* 3, 4, 28

Brülhart, M., Gruber, J., Krapf, M., and Schmidheiny, K. (2022). Behavioral Responses to Wealth Taxes: Evidence from Switzerland. *American Economic Journal: Economic Policy*, 14(4):111–150. 4

Cameron, A. C., Gelbach, J. B., and Miller, D. L. (2011). Robust Inference With Multiway Clustering. *Journal of Business & Economic Statistics*, 29(2):238–249. 17

Chetty, R. (2009). Is the Taxable Income Elasticity Sufficient to Calculate Deadweight Loss? The Implications of Evasion and Avoidance. *American Economic Journal: Economic Policy*, 1(2):31–52. 28

Dahl, M. S. and Sorenson, O. (2010). The Social Attachment to Place. *Social Forces*, 89(2):633–658. 1

de Chaisemartin, C. and D'Haultfoeuille, X. (2020). Two-way Fixed Effects Estimators with Heterogeneous Treatment Effects. *American Economic Review*, 110(9):2964–1996. 77, 78

Di Marzio, I., Mocetti, S., and Rubolino, E. (2023). Market Externalities of Tax Evasion. *Unpublished manuscript*. 24

Epple, D. and Romer, T. (1991). Mobility and Redistribution. *Journal of Political Economy*, 99(4):828–858. 33

Faini, R., Galli, G., Gennari, P., and Rossi, F. (1997). An Empirical Puzzle: Falling Migration and Growing Unemployment Differentials among Italian Regions. *European Economic Review*, 41(3-5):571–579. 1

Fajgelbaum, P. D., Morales, E., Serrato, J. C. S., and Zidar, O. (2019). State Taxes and Spatial Misallocation. *The Review of Economic Studies*, 86(1):333–376. 4

Feldstein, M. and Wrobel, M. V. (1998). Can State Taxes Redistribute Income? *Journal of Public Economics*, 68(3):369–396. 4, 33

Fuest, C., Peichl, A., and Siegloch, S. (2018). Do Higher Corporate Taxes Reduce Wages? Micro Evidence from Germany. *American Economic Review*, 108(2):393–418. 4

Giommoni, T. and Rubolino, E. (2022). The Cost of Gender Identity Norms: Evidence from a Spouse Tax Credit. *Dondena Working Paper No. 153*. 12

Giroud, X. and Rauh, J. (2019). State Taxation and the Reallocation of Business Activity: Evidence from Establishment-Level Data. *Journal of Political Economy*, 127(3):1262–1316. 4

Gruber, J. and Saez, E. (2002). The Elasticity of Taxable Income: Evidence and Implications. *Journal of Public Economics*, 84(1):1–32. 3, 6, 24

Kanbur, R. and Keen, M. (1993). Jeux Sans Frontieres: Tax Competition and Tax Coordination when Countries Differ in Size. *American Economic Review*, 83(4):877–92. 18, 22

Keane, M. P. (2011). Labor Supply and Taxes: A Survey. *Journal of Economic Literature*, 49(4):961–1075. 27

Kleven, H. J., Landais, C., Muñoz, M., and Stantcheva, S. (2020). Taxation and Migration: Evidence and Policy Implications. *Journal of Economic Perspectives*, 34(2):119–142. 1, 4, 18, 23, 32

Kleven, H. J., Landais, C., and Saez, E. (2013). Taxation and International Migration of Superstars: Evidence from the European Football Market. *American Economic Review*, 103(5):1892–1924. 1, 4, 22, 26

Kleven, H. J., Landais, C., Saez, E., and Schultz, E. (2014). Migration and Wage Effects of Taxing Top Earners: Evidence from the Foreigners' Tax Scheme in Denmark. *The Quarterly Journal of Economics*, 129(1):333–378. 1, 4

Lehmann, E., Simula, L., and Trannoy, A. (2014). Tax Me if You Can! Optimal Nonlinear Income Tax Between Competing Governments. *The Quarterly Journal of Economics*, 129(4):1995–2030. 1, 5, 7, 8

Liebig, T., Puhani, P. A., and Sousa-Poza, A. (2007). Taxation and Internal Migration: Evidence from the Swiss Census Using Community-Level Variation in Income Tax Rates. *Journal of Regional Science*, 47(4):807–836. 28

Manacorda, M. and Moretti, E. (2006). Why Do Most Italian Youths Live with Their Parents? Intergenerational Transfers and Household Structure. *Journal of the European Economic Association*, 4(4):800–829. 1

Martínez, I. Z. (2022). Mobility Responses to the Establishment of a Residential Tax Haven: Evidence from Switzerland. *Journal of Urban Economics*, 129(103441). 1, 4, 22

Michelacci, C. and Silva, O. (2007). Why So Many Local Entrepreneurs? *Review of Economics and Statistics*, 89(4):615–633. 1

Milligan, K. and Smart, M. (2019). An Estimable Model of Income Redistribution in a Federation: Musgrave Meets Oates. *American Economic Journal: Economic Policy*, 11(1):406–434. 4

Mirrlees, J. A. (1982). Migration and Optimal Income Taxes. *Journal of Public Economics*, 18(3):319–341. 1

Moretti, E. and Wilson, D. J. (2014). State Incentives for Innovation, Star Scientists and Jobs: Evidence from Biotech. *Journal of Urban Economics*, 79:20–38. 4

Moretti, E. and Wilson, D. J. (2017). The Effect of State Taxes on the Geographical Location of Top Earners: Evidence from Star Scientists. *American Economic Review*, 107(7):1858–1903. 1, 4, 20, 21

Moulton, B. R. (1990). An Illustration of a Pitfall in Estimating the Effects of Aggregate Variables on Micro Units. *The Review of Economics and Statistics*, 72(2):334. 17

Muñoz, M. (2020). Do European Top Earners React to Labour Taxation Through Migration? *Working Paper, Paris School of Economics*. 1, 4

Musgrave, R. A. (1959). The Theory of Public Finance: A Study in Public Economy. London: McGraw-Hill. 4

Oates, W. E. (1972). *Fiscal Federalism*. NY: Harcourt Brace Jovanovich. 4, 30

Parchet, R. (2019). Are Local Tax Rates Strategic Complements or Strategic Substitutes? *American Economic Journal: Economic Policy*, 11(2):189–224. 4

Piketty, T. and Saez, E. (2013). Optimal Labor Income Taxation. In Auerbach, A. J., Chetty, R., Feldstein, M., and Saez, E., editors, *Handbook of Public Economics*, pages 391–474. Elvesier-North, Amsterdam. 1, 30

Rubolino, E. (2020). Tax-Induced Transfer of Residence: Evidence from Tax Decentralization in Italy. *Available at SSRN: https://ssrn.com/abstract=3710932 or http://dx.doi.org/10.2139/ssrn.3710932*. 19

Rubolino, E. and Waldenström, D. (2019). Trends and Gradients in Top Tax Elasticities: Cross-Country Evidence, 1900–2014. *International Tax and Public Finance*, 26(3):457–485. 25

Saez, E. (2001). Using Elasticities to Derive Optimal Income Tax Rates. *The Review of Economic Studies*, 68(1):205–229. 8

Saez, E. (2003). The Effect of Marginal Tax Rates on Income: A Panel Study of 'Bracket Creep'. *Journal of Public Economics*, 87(5-6):1231–1258. 11

Saez, E., Slemrod, J., and Giertz, S. H. (2012). The Elasticity of Taxable Income with Respect to Marginal Tax Rates: A Critical Review. *Journal of Economic Literature*, 50(1):3–50. 2, 4, 18, 24, 25, 27, 78

Schmidheiny, K. (2006). Income Segregation and Local Progressive Taxation: Empirical Evidence from Switzerland. *Journal of Public Economics*, 90(3):429–458. 4, 29

Schmidheiny, K. and Slotwinski, M. (2018). Tax-induced Mobility: Evidence from a Foreigners' Tax Scheme in Switzerland. *Journal of Public Economics*, 167:293–324. 4

Slattery, C. and Zidar, O. (2020). Evaluating State and Local Business Incentives. *Journal of Economic Perspectives*, 34(2):90–118. 4

Slemrod, J. (2010). Location, (Real) Location, (Tax) Location: An Essay on Mobility's Place in Optimal Taxation. *National Tax Journal*, 63(4, Part 2):843–864. 2, 28

Suárez Serrato, J. C. and Zidar, O. (2016). Who Benefits from State Corporate Tax Cuts? A Local Labor Markets Approach with Heterogeneous Firms. *American Economic Review*, 106(9):2582–2624. 4

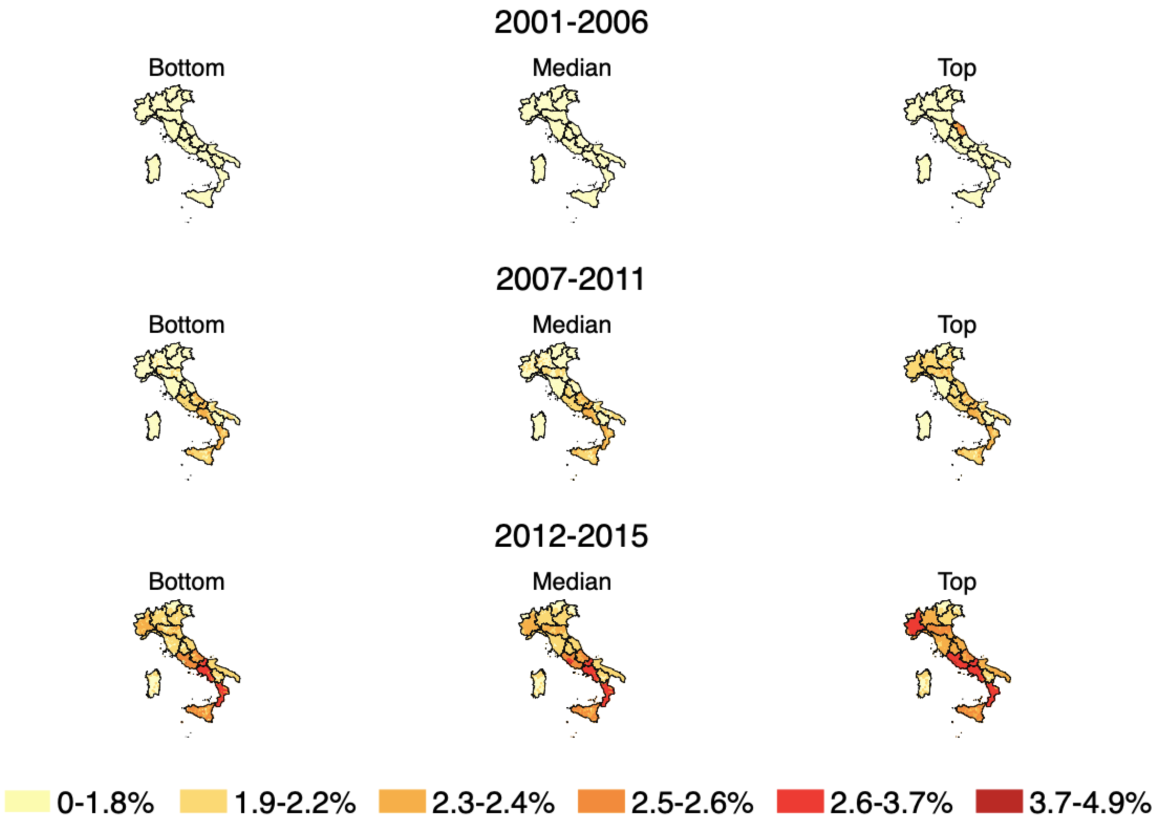
Tiebout, C. M. (1956). A Pure Theory of Local Expenditures. *Journal of Political Economy*, 64(5):416–424. 1, 4

Weber, C. E. (2014). Toward obtaining a consistent estimate of the elasticity of taxable income using difference-in-differences. *Journal of Public Economics*, 117:90–103. 24

Wildasin, D. E. (1985). Income Taxes and Urban Spatial Structure. *Journal of Urban Economics*, 18(3):313–333. 29

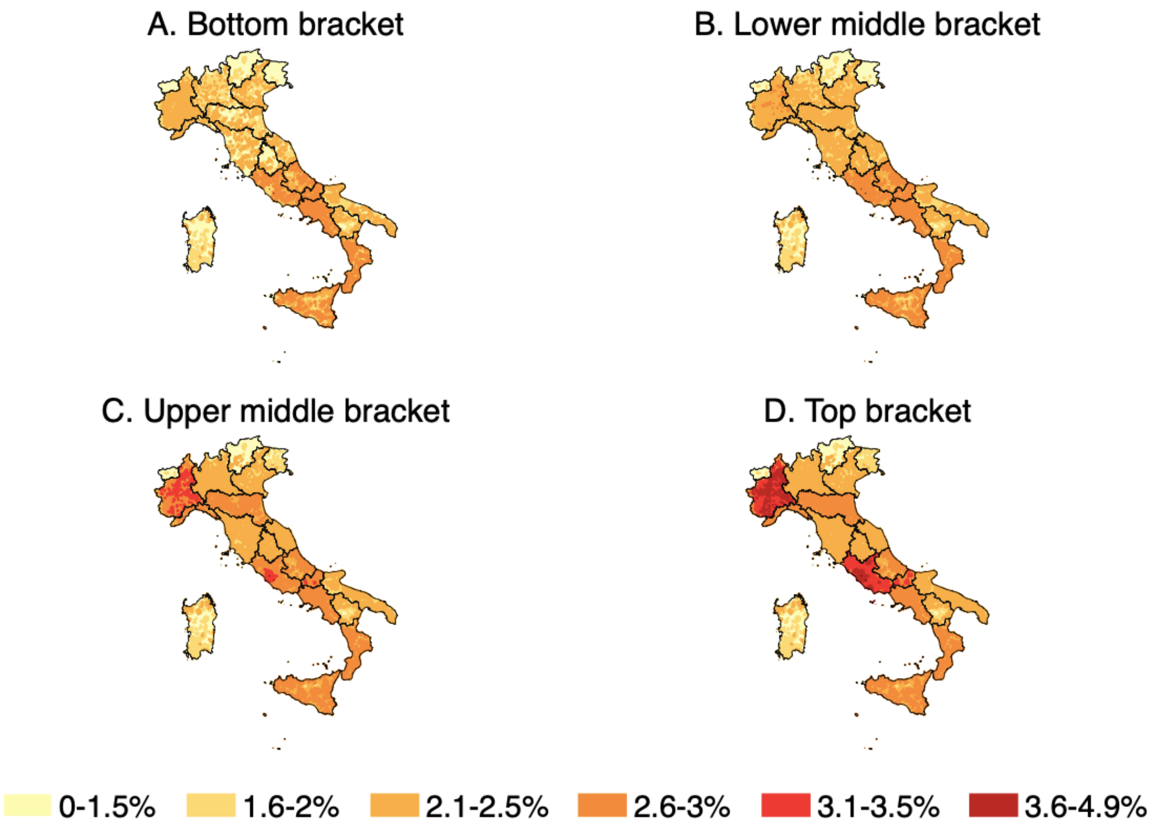
Young, C., Varner, C., Lurie, I. Z., and Prisinzano, R. (2016). Millionaire Migration and Taxation of the Elite. *American Sociological Review*, 81(3):421–446. 4

Figure 1: Evolution in the local average tax rate on personal income



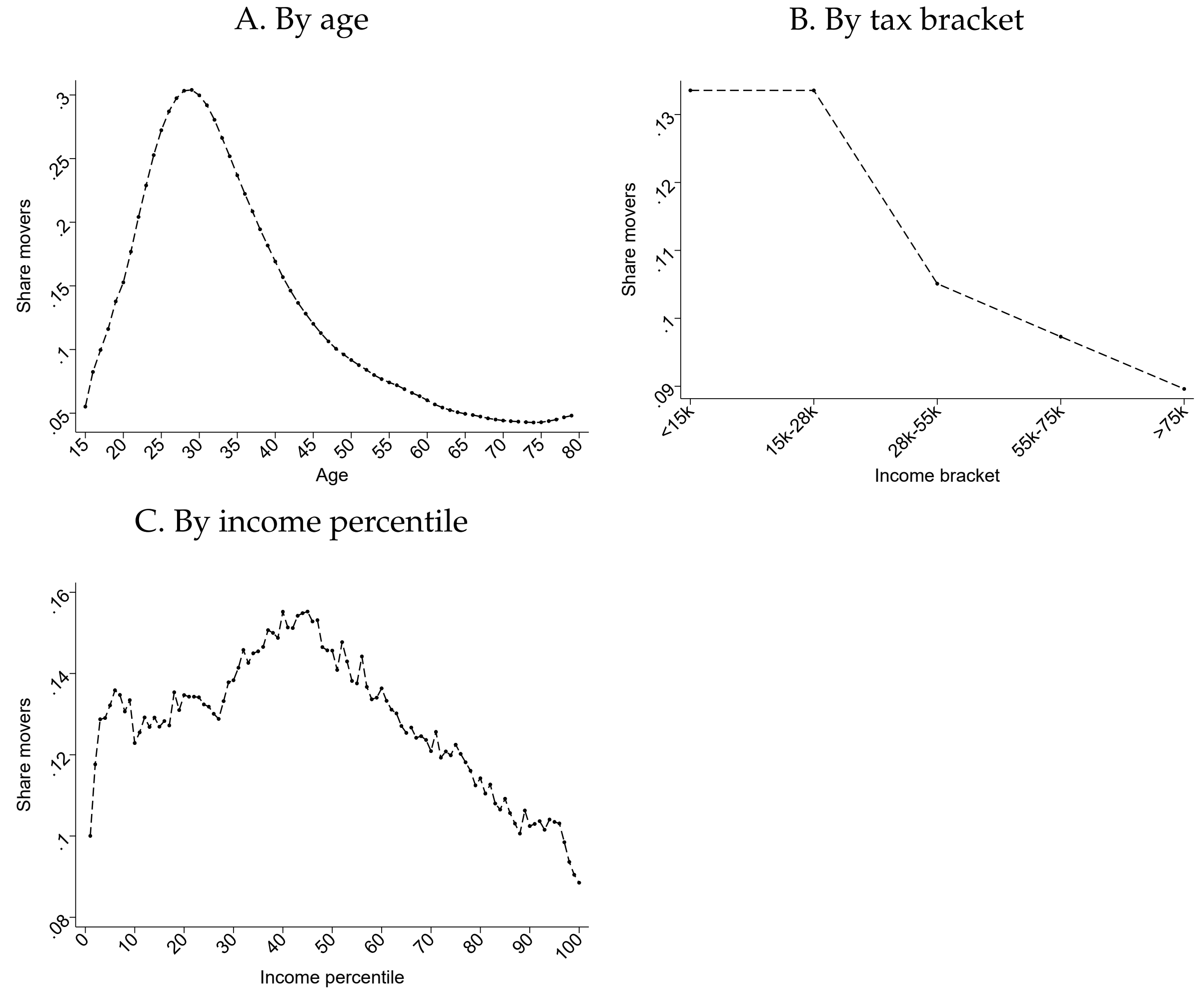
Note: The figure depicts the evolution in the local average tax rate (summing up the tax rate set by regions and municipalities) on personal income defined at the 99th income percentile (%). The black line indicates regional boundaries.

Figure 2: Local average tax rate by bracket in 2015



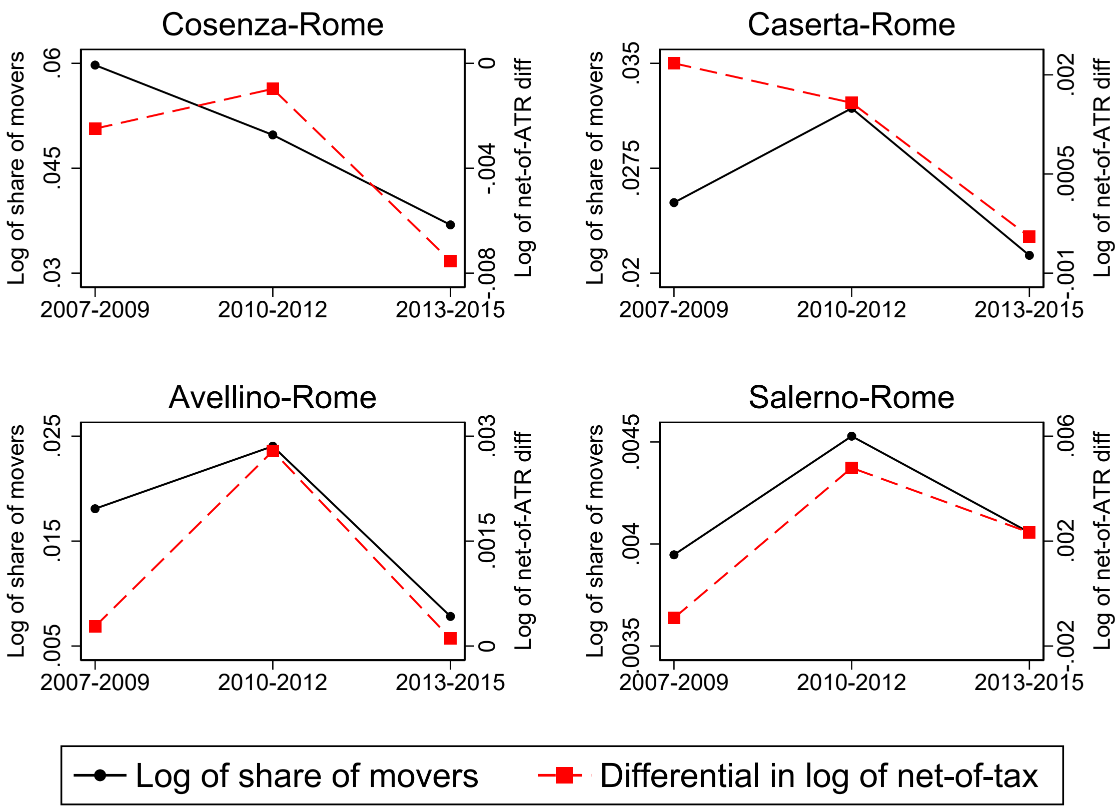
Note: This graph depicts the local average tax rate (summing up the tax rate set by regions and municipalities) on personal income in 2015 for taxpayers in bottom, lower middle, upper middle, and top income bracket. The black line indicates regional boundaries.

Figure 3: Descriptive Evidence on Movers



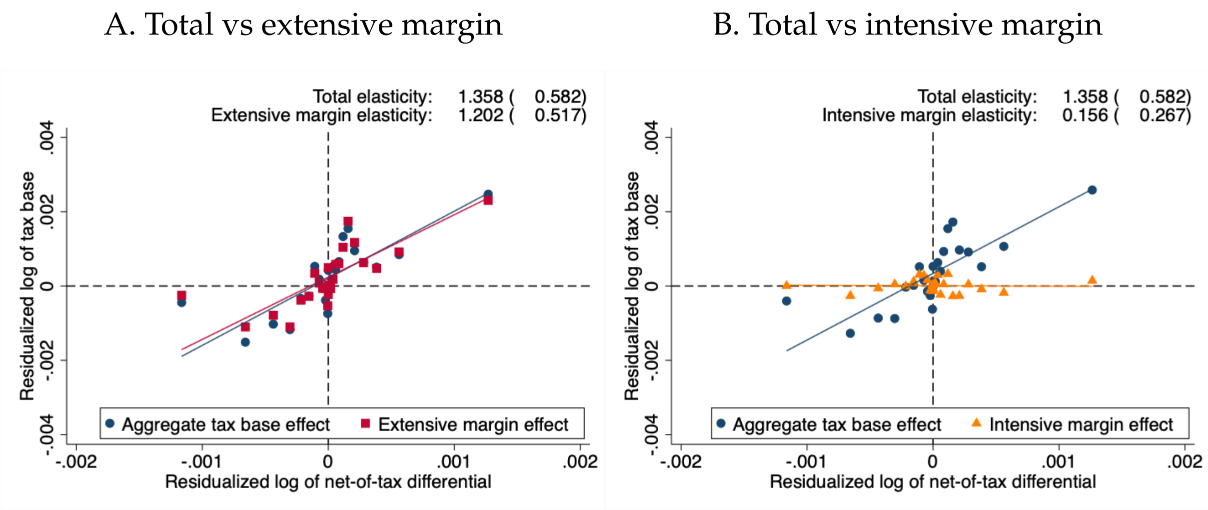
Note: This figure depicts the share of taxpayers that are classified as "movers" in each age group (panel A), tax bracket (panel B), and percentile of the gross income distribution (panel C). A taxpayer is defined as a "mover" if she changed her municipality of residence at least once over the period observed in our data (2007-2014). In panel C, the income distribution only covers taxpayers reporting income above the no-tax area.

Figure 4: Descriptive Evidence on Tax-Induced Mobility, Selected Province Pairs



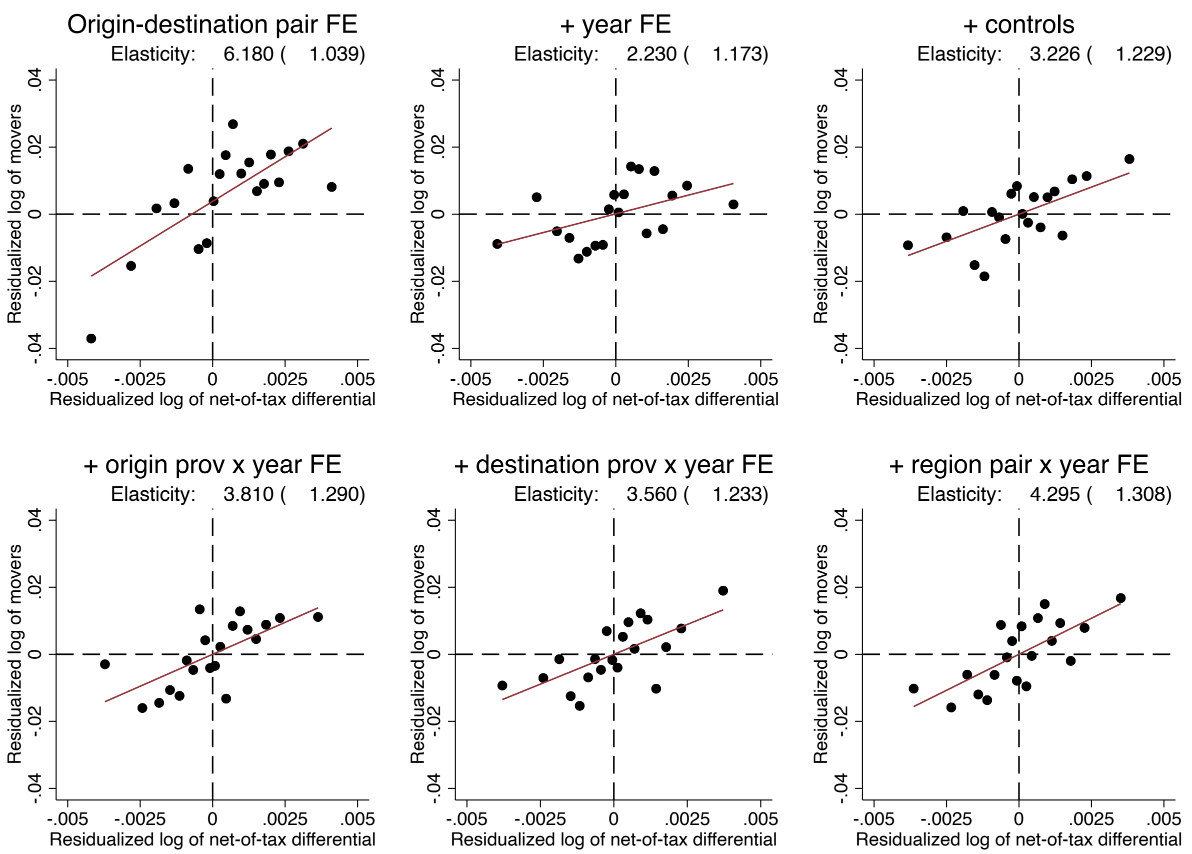
Note: This figure relates the log of share of movers (left-hand side vertical axis) with the log of net-of-average tax rate differential (right-hand side vertical axis) from selected origin-destination province pairs over the 2007-2015 period. It focuses on the four province pairs with the largest observed share of movers (as a share of the population in the origin location): Cosenza (origin)-Rome (destination), Caserta-Rome, Avellino-Rome, and Salerno-Rome. Data on the universe of tax residence transfers over the 2007-2015 period provided by the Italian Institute of Statistics.

Figure 5: Aggregate Evidence on Tax Base Elasticity



Note: This figure provides a graphical representation of the tax base elasticity with respect to the net-of-tax rate. The left-hand side figure illustrates the role of extensive margin responses by comparing the log of total tax base and the log of population stock (vertical axis) with the differential in the log net-of-average tax rate (horizontal axis). The right-hand side figure illustrates the role of intensive margin responses by comparing the log of total tax base and the log of average income per capita (vertical axis) with the log net-of-average tax rate differential (horizontal axis). We depict the residuals obtained by regressing each variable on income $\times$ municipality fixed effects, income class $\times$ local labor market $\times$ year fixed effects, and municipality $\times$ year fixed effects. The figure plots the residuals in 25 equal-sized bins and shows the line of best fit, which corresponds to the β estimate obtained from regressing equation (12). We also report the elasticity estimates and standard errors in parenthesis, with three-way clustering by municipality $\times$ income class, income class $\times$ year, and municipality $\times$ year. Data from tax returns composed of 7,918 municipalities $\times$ 7 income classes over the 2001-2015 period.

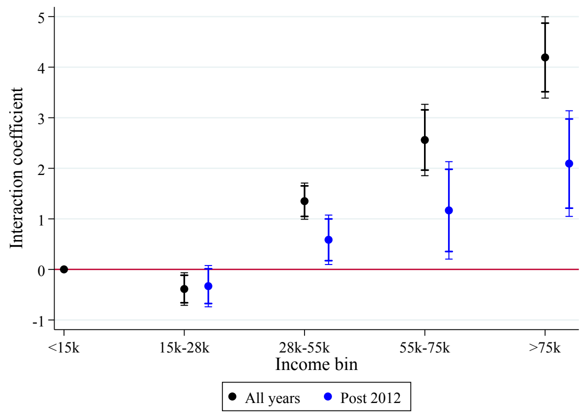
Figure 6: Tax-induced Mobility Response



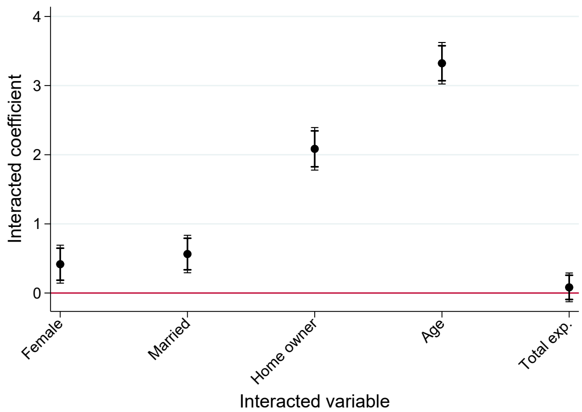
Note: The figure compares the log outmigration odds-ratio from an origin location o to a destination location d (vertical axis) with the differential in the log net-of-average tax rate differential between d and o (horizontal axis). We depict the residuals obtained by (cumulatively) regressing the two variables on origin-destination location pair fixed effects, year fixed effects and pair-specific time trends, the differential in property taxes and public spending, origin province $\times$ year fixed effects, destination province $\times$ year fixed effects, and region pair $\times$ year fixed effects. The figure plots the residuals in 20 equal-sized bins and shows the line of best fit. The positive slope suggests that, on average, mobility from o to d increases as the tax rate in o becomes larger than in d. The sample includes 4,549,111 transfers of residence moving within 10,697 province pairs over the 2007-2015 period.

Figure 7: Heterogeneous Responses

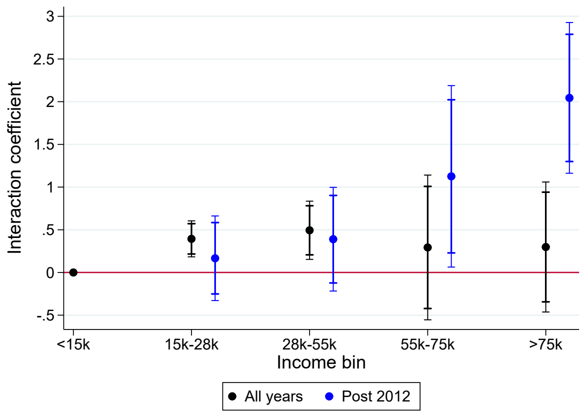
A. Intensive margin responses:
by income bin



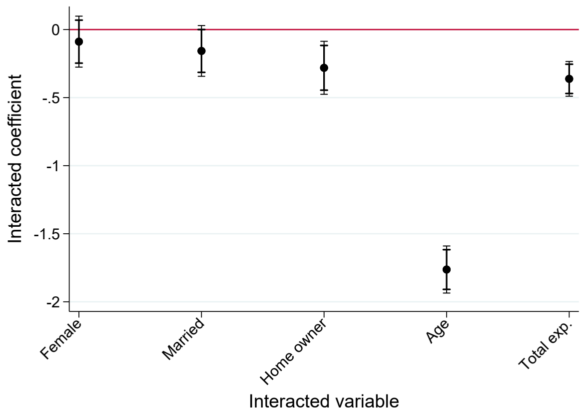
B. Intensive margin responses:
by socio-demographic and municipality



C. Extensive margin responses:
by income bin



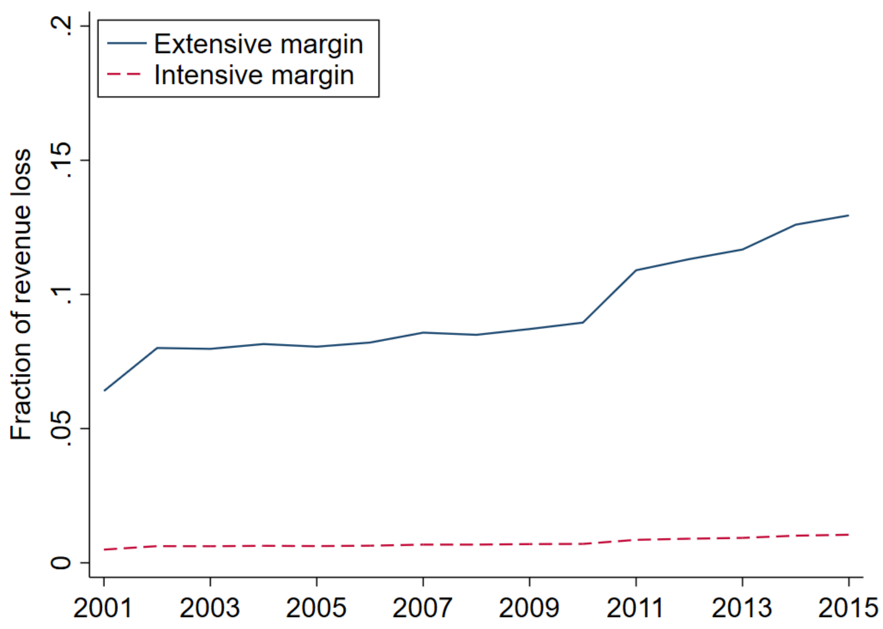
D. Extensive margin responses:
by socio-demographic and municipality



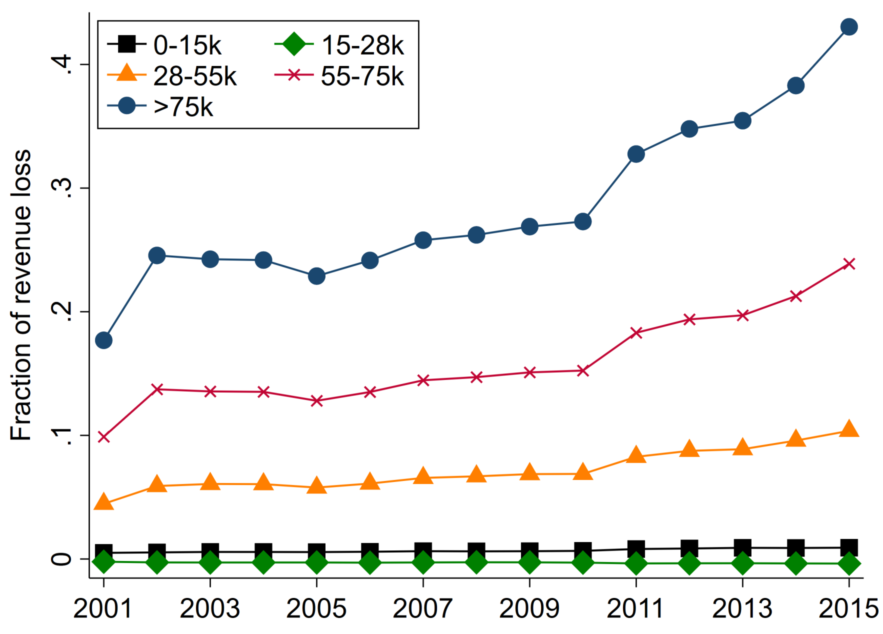
Note: This figure depicts heterogeneous responses to local income taxation over the intensive (top graphs) and extensive (bottom graphs) margin. Each figure reports the net-of-tax elasticity estimate and both 90 and 95 confidence intervals from standard errors clustered at the individual level. The left-hand side graphs plot the coefficient estimate from an interaction term between the log of the net-of-tax rate and each income bin (where the baseline group - omitted - is the first income bin). It thus plots how much larger (or smaller) is the elasticity estimate in each income bin with respect to the baseline income bin. For each graph, we report estimates computed over the full sample (2007-2014; in black), and for the post-decentralization period (2012-2014; in blue). The right-hand side graphs plot the coefficient estimate by interacting the net-of-tax rate with the following dummy variables: female, married, age above the median, municipal current expenditures per-capita above the median, and municipal social expenditures per-capita above the median. Each specification controls for individual × declaration type (i.e., retiree, dependent worker, self-employee) fixed effects, income class × year fixed effect, income class × declaration type fixed effects, and income bin × municipality fixed effects. Data from individual tax returns from the Veneto region over the 2007-2014 period.

Figure 8: Fraction of Revenue Losses From Behavioral Responses

A. Revenue Loss by Type of Response



B. Revenue Loss by Income Bracket



Note: The top panel shows the fraction of revenue losses due to extensive margin responses (blue solid line) and intensive margin responses (red dashed line) over the 2001-2015 period. To derive these estimates, we use the elasticity estimates that we obtain from the aggregate analysis (column (2) and (3) of Table 1 for the extensive and intensive margin elasticity, respectively), and we take the tax rate and the Pareto parameter from the data. The bottom panel depicts the fraction of revenue losses due to behavioral responses (both intensive and extensive) for each income bracket. To derive these estimates, we use the elasticity estimates that we obtain from the heterogeneity analysis (panel A and C of Figure 7 for the extensive and intensive margin elasticity, respectively), and we take the tax rates and the Pareto parameter from the data.

Table 1: Behavioral Responses to Local Income Taxation

Tax rate measure:	Elasticity estimate:		
	Total	Extensive margin	Intensive margin
	(1)	(2)	(3)
Net of average tax rate	1.358**	1.202**	0.156
	(0.582)	(0.517)	(0.267)
Net of marginal tax rate	0.916***	0.822***	0.093
	(0.323)	(0.305)	(0.114)
Observations	696,111	696,111	696,111
Income class × municipality FE	Yes	Yes	Yes
Municipality × year FE	Yes	Yes	Yes
Income class × LLM × year FE	Yes	Yes	Yes
Mean dependent	15,592,115	839	47,397

Note: This table shows the elasticity of tax base (column 1), population stock (column 2), and income per capita (column 3) with respect to the average (first row) or marginal (second row) net-of-local income tax rate. Each specification controls for income class × municipality fixed effects, income class × local labor market × year fixed effects, and municipality × year fixed effects. Standard errors in parenthesis, with three-way clustering by municipality × income class, income class × year, and municipality × year. Data from tax returns composed of 7,918 municipalities × seven income classes over the 2001-2015 period.

Table 2: Intensive Margin Elasticity from the Micro-Level Analysis

	Outcome variable: log of taxable income					
	OLS	2SLS	OLS	2SLS	OLS	2SLS
	(1)	(2)	(3)	(4)	(5)	(6)
log of net-of-MTR	0.172*	0.095	0.384***	0.331	0.093	0.293
	(0.091)	(0.237)	(0.090)	(0.238)	(0.088)	(0.230)
Observations	19,540,361	16,433,563	19,540,361	16,433,563	19,540,361	16,433,563
Individual × dec type FE	Yes	Yes	Yes	Yes	Yes	Yes
Income bin × year FE	Yes	Yes	Yes	Yes	Yes	Yes
Income bin × dec type FE	No	No	Yes	Yes	Yes	Yes
Gender × year FE	No	No	No	No	Yes	Yes
Age group × year FE	No	No	No	No	Yes	Yes
Marital status × year FE	No	No	No	No	Yes	Yes

Note: This table shows the elasticity of taxable income with respect to the net-of-marginal income tax rate. Columns 1, 3, and 5 report the OLS estimates, while columns 2, 4, and 6 display the 2SLS estimates computed by using the log of the instrumented net-of-marginal tax rate. Each specification controls for individual × declaration type (i.e., retiree, dependent worker, self-employee) fixed effects, and income class × year fixed effects. Columns (3) and (4) further account for income class × declaration type fixed effects, while columns (5) and (6) also include gender × year, age group × year, and marital status × year fixed effects. Standard errors are clustered at the individual level in parenthesis. Data from individual tax returns from the Veneto region over the 2007-2014 period.

Table 3: Extensive Margin Elasticity from the Micro-Level Analysis

	Outcome variable: out-migration dummy					
	OLS	2SLS	OLS	2SLS	OLS	2SLS
	(1)	(2)	(3)	(4)	(5)	(6)
log of net-of-ATR diff	1.162***	0.904***	1.163**	0.905***	1.226***	0.959***
	(0.051)	(0.061)	(0.051)	(0.061)	(0.051)	(0.061)
Observations	19,363,375	16,100,928	19,363,375	16,100,928	19,363,375	16,100,928
Individual × dec type FE	Yes	Yes	Yes	Yes	Yes	Yes
Income bin × year FE	Yes	Yes	Yes	Yes	Yes	Yes
Income bin × dec type FE	No	No	Yes	Yes	Yes	Yes
Gender × year FE	No	No	No	No	Yes	Yes
Age group × year FE	No	No	No	No	Yes	Yes
Marital status × year FE	No	No	No	No	Yes	Yes

Note: This table shows the elasticity of migration with respect to the net-of-average income tax rate differential. The net-of-average tax rate differential is computed as the difference between the net-of-average tax rate of all the other potential destination municipalities and the net-of-tax rate in the current municipality of residence. Columns 1, 3, and 5 report the OLS estimates, while columns 2, 4, and 6 display the 2SLS estimates computed using the log of the instrumented net-of-average tax rate differential. Each specification controls for individual × declaration type (i.e., retiree, dependent worker, self-employee) fixed effects, and income class × year fixed effects. Columns (3) and (4) further account for income class × declaration type fixed effects, while columns (5) and (6) also include gender × year, age group × year, and marital status × year fixed effects. Standard errors are clustered at the individual level in parenthesis. Data from individual tax returns from the Veneto region over the 2007-2014 period.

Table 4: Taxation and Separation between Workplace and Residence

	Outcome variable: dummy = 1 if workplace in the same municipality			
	(1)	(2)	(3)	(4)
log of net-of-ATR diff	1.982**	2.079**	2.021**	1.806**
	(0.837)	(0.836)	(0.827)	(0.808)
Observations	1,992,600	1,992,600	1,992,600	1,992,600
Municipality × occupation FE	Yes	Yes	Yes	Yes
Municipality × year FE	Yes	Yes	Yes	Yes
Year × occupation FE	Yes	Yes	Yes	Yes
Individual controls	No	Yes	Yes	Yes
Year × occupation × region FE	No	No	Yes	Yes
Individual controls × year FE	No	No	No	Yes
Mean outcome (%)	0.582	0.582	0.582	0.582

Note: This table shows the elasticity of living in the same municipality of the workplace with respect to the net-of-average income tax rate differential. The outcome variable is a dummy equal to 1 if an individual lives in the same municipality where the workplace is located. The net-of-average tax rate differential is computed as the log difference between the net-of-average tax rate of the municipality of residence and the net-of-tax rate of all the other municipalities located in the same region. We calculate the average tax rate based on an income level equal to: i. the top income bracket for legislators, senior officials, and managers (ISCO group 1); ii. the median income for professionals, associate professionals, and technicians (ISCO groups 2 and 3); iii. the bottom income bracket for clerks, service workers, and all the other low-skill workers (ISCO groups from 4 to 8). Each specification controls for municipality-occupation group, municipality-year, and year-occupation group fixed effects. In column (2), we add the following individual-level controls: gender, age and its square, civil status, and educational attainment. We also control for occupation-year-region fixed effects in column (3). In column (4), we interact the individual-level controls with year fixed effects. Each regression includes sampling weights. Estimates based on data from the Italian labor force survey over the 2004-2015 period. Standard errors in parenthesis, with three-way clustering by municipality × occupation, occupation × year, and municipality × year.

Online Appendix (Not for Publication)

A Additional Tables and Figures

Table A1: Transition Matrix for Cross-Bracket Fluctuations

Income bracket at t	Income bracket at $t+1$				
	0-15k	15k-28k	28k-55k	55k-75k	> 75k
0-15k	0.886	0.109	0.005	0.001	0.000
15k-28k	0.079	0.865	0.055	0.001	0.000
28k-55k	0.018	0.109	0.836	0.032	0.005
55k-75k	0.011	0.022	0.192	0.641	0.134
>75k	0.007	0.010	0.044	0.098	0.841

Note: This table depicts the probability of transitioning across income brackets. Each entry can be interpreted as the probability that a taxpayer will move from a given origin bracket at time t to any potential destination bracket at time $t+1$. Tax returns data from the universe of Veneto taxpayers over the 2007-2014 period.

Table A2: Behavioral Responses to Local Income Taxation, Heterogeneity by Number of Tax Changes

Tax rate measure:	Elasticity estimate:		
	Total	Extensive margin	Intensive margin
	(1)	(2)	(3)
Net of average tax rate	1.358**	1.202**	0.156
	(0.582)	(0.517)	(0.267)
... × N of tax changes > median	0.251	0.036	0.214
	(0.822)	(0.702)	(0.402)
Net of marginal tax rate	0.916***	0.822***	0.093
	(0.323)	(0.305)	(0.114)
... × N of tax changes > median	-0.403	-0.255	-0.148
	(0.623)	(0.570)	(0.242)
Observations	696,111	696,111	696,111
Income class × municipality FE	Yes	Yes	Yes
Municipality × year FE	Yes	Yes	Yes
Income class × LLM × year FE	Yes	Yes	Yes
Mean dependent	15,592,115	839	47,397

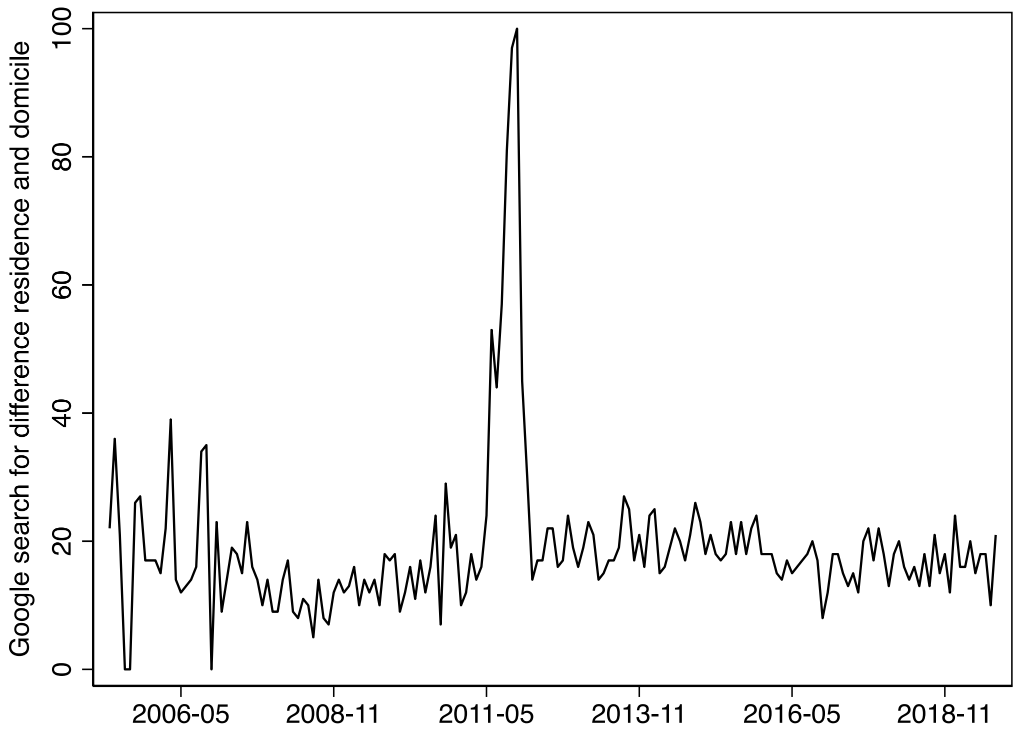
Note: This table shows the elasticity of tax base (column 1), population stock (column 2), and income per capita (column 3) with respect to the average (first row) or marginal (second row) net-of-local income tax rate, interacted with a dummy equal to 1 for municipalities-income class cells with a number of tax rate changes that is larger than the median value. Each specification controls for income class × municipality fixed effects, income class × local labor market × year fixed effects, and municipality × year fixed effects. Standard errors in parenthesis, with three-way clustering by municipality × income class, income class × year, and municipality × year. Data from tax returns composed of 7,918 municipalities × 7 income classes over the 2001-2015 period.

Table A3: Extensive Margin Elasticity from the Micro-Level Analysis, Additional Specifications

	Outcome variable: out-migration dummy					
	OLS	2SLS	OLS	2SLS	OLS	2SLS
	(1)	(2)	(3)	(4)	(5)	(6)
log of net-of-ATR diff	1.137***	0.868***	1.193***	0.933***	1.837***	1.216***
	(0.051)	(0.061)	0.051)	(0.061)	(0.216)	(0.275)
Observations	19,363,362	16,100,910	19,363,344	16,100,910	19,363,344	16,100,890
Individual × dec type FE	Yes	Yes	Yes	Yes	Yes	Yes
Income bin × year FE	Yes	Yes	Yes	Yes	Yes	Yes
Municipality × dec type FE	Yes	Yes	Yes	Yes	Yes	Yes
Income bin × dec type FE	Yes	Yes	Yes	Yes	Yes	Yes
Municipality × inc bin FE	Yes	Yes	Yes	Yes	Yes	Yes
Dec type FE × year FE	No	No	Yes	Yes	Yes	Yes
Municipality × year FE	No	No	No	Yes	Yes	Yes

Note: This table shows the elasticity of migration with respect to the net-of-average income tax rate differential. The net-of-average tax rate differential is computed as the difference between the net-of-average tax rate of all the other potential destination municipalities and the net-of-tax rate in the current municipality of residence. Columns 1, 3, and 5 report the OLS estimates, while columns 2, 4, and 6 display the 2SLS estimates computed using the log of the instrumented net-of-average tax rate differential. Each specification controls for individual × declaration type (i.e., retiree, dependent worker, self-employee) fixed effects, and income class × year fixed effects. Columns (3) and (4) further account for income class × declaration type fixed effects, while columns (5) and (6) also include municipality × year fixed effects. Standard errors are clustered at the individual level in parenthesis. Data from individual tax returns from the Veneto region over the 2007-2014 period.

Figure A1: Google search for “difference domicile and residence”



Note: This figure depicts the trend in google search for “difference domicile and residence” (*differenza domicilio e residenza*). Searches are normalized to 100 in the peak period.

B Local Income Taxation in Italy

This Appendix provides detailed information on the set of rules regulating the income tax set by municipalities and regions in Italy.

B.1 Municipal Tax on Personal Income

According to article 1 of Legislative Decree 360/1998, municipalities can establish an income tax on top of the tax rate set by the central and regional governments. The top tax rate cannot exceed the 0.8 percent, except for cases expressly provided by the law, such as the case of the city of Rome, which, can establish a rate of up to 0.9 percent since 2011.

Starting in 2007, municipalities have been granted the right to introduce an exemption threshold from the tax in the presence of specific income requirements. In this case, the municipal income tax is not due if the income is lower or equal to the limit established by the municipality. Since 2011, municipalities can establish a single rate or a plurality of different rates. If a municipality implements a graduated tax scheme, tax rates must be articulated according to the same income brackets established for the national income tax, *Imposta sul Reddito delle Persone Fisiche* (IRPEF), as well as diversified and increasing with income.

The municipal income tax (as well as the income tax set by the regional and national government) depends on the municipality in which the taxpayer has her tax residence on the 1st of January of the year to which the payment of the tax refers. The tax is calculated by applying the rate set by the municipality to the total income determined for *IRPEF* purposes, net of deductible costs and tax credits for income generated abroad. The payment of the municipal income tax is made on account and balance, together with the payment of the income tax for the regional and national governments.

For the years 2016 and 2017, municipalities cannot change the income tax rate(s). The same law states that the local tax freeze does not apply to the municipal waste disposal tax (*TARI*). Furthermore, the tax freeze does not apply to local authorities that are on *predissesto* or a situation of financial instability, as referred by Article 243-bis and Article 246 of Legislative Decree no. 267/2000.

Municipalities retain revenue from the municipal income tax. Tax intakes are mostly used to deliver public goods provisions, such as public transportation, waste management and to finance school facilities.

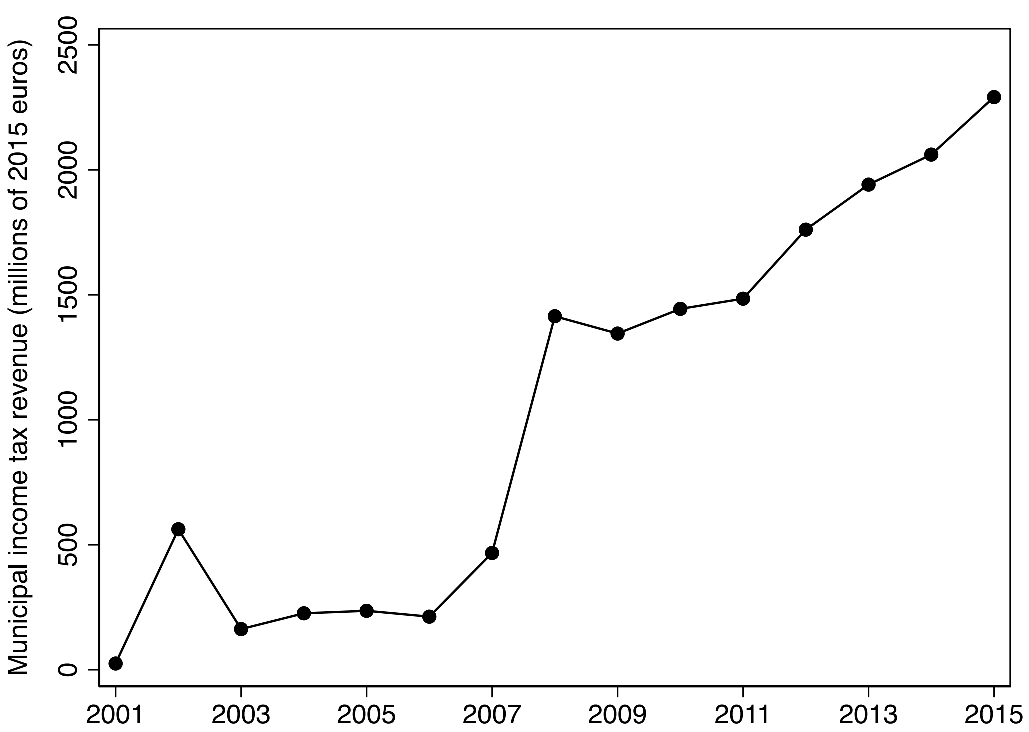
In the following, we list the laws concerning the income tax set by municipalities:

- Law 15 December 1997, n. 446, Article 52. *Istituzione dell'imposta regionale sulle attività produttive, revisione degli scaglioni, delle aliquote e delle detrazioni dell'Irpef e istituzione di una addizionale regionale a tale imposta, nonché riordino della disciplina dei tributi locali*

- Law 28 September 1998, n. 360. *Istituzione di una addizionale comunale all'IRPEF*.
- Law 27 December 2006, n. 296. *Disposizioni per la formazione del bilancio annuale e pluriennale dello Stato*.
  - Article 1, comma 161. *Modalità e termini per l'accertamento, da parte degli enti locali, dei tributi di propria competenza*.
  - Article 1, comma 162. *Requisiti minimi che devono possedere gli atti di accertamento di tributi locali*.
  - Article 1, comma 163. *Termine per la notifica degli atti esecutivi relativi a tributi locali*.
  - Article 1, comma 164. *Termine per la richiesta di rimborso, da parte del contribuente, di tributi locali non dovuti*.
  - Article 1, comma 165. *Misura degli interessi sui rimborsi di imposta*.
  - Article 1, comma 166. *Arrotondamento del versamento di tributi locali*.
  - Article 1, comma 167. *Modalità di compensazione di tributi locali*.
  - Article 1, comma 168. *Soglie minime per l'esigibilità di tributi locali*.
  - Article 1, comma 169. *Proroga automatica delle aliquote vigenti in mancanza di nuova delibera*.
- Law 31 May 2010. *Misure urgenti in materia di stabilizzazione finanziaria e di competitività economica.*
- Law 14 March 2011, n. 23. *Disposizioni in materia di federalismo fiscale municipale.*
  - Article 14. *Ambito di applicazione del decreto legislativo, regolazioni finanziarie e norme transitorie*.
- Law 13 August 2011, n. 138. *Ulteriori misure urgenti per la stabilizzazione finanziaria e per lo sviluppo.*
  - Article 1. *Disposizioni per la riduzione della spesa pubblica*.
- Law 21 November 2014, n. 175, Article 8. *Semplificazione fiscale e dichiarazione dei redditi precompilata.*
- Law 28 December 2015, n. 208. *Disposizioni per la formazione del bilancio annuale e pluriennale dello Stato*.

  Revenue from the regional and municipal income tax accounts for 28,302 million euros, which is nearly 16 percent of total revenue in 2015. Figure B1 shows the trend in total revenue raised from the municipal income tax over the 2001-2015 period. The figure clearly underlines the process of tax decentralization described above. Tax revenue was around 25 million euros in 2001, then they substantially rose after the first wave of decentralization in 2007 (to around 1,500 million) and continue to gradually increase after the 2011 reform. In 2015, municipalities raised around 2,500 million euros from the municipal income tax. This accounts for around 1.5 percent of the total personal income tax revenue raised by Italy in 2015 (that amount to nearly 173,007 million euros).

Figure B1: Tax Revenue from the Municipal Income Tax



Note: This figure depicts the trend in total revenue (millions of 2015 euros) raised from the municipal income tax. The sample includes 7,960 municipalities over the 2001-2015 period.

B.2 Regional Tax on Personal Income

Law 446/1998 introduced the regional surcharge to the income tax. The tax rate is applied to total taxable income, net of deductible costs, deductions, the tax credit for profits distributed by companies and entities, and income produced abroad.

The basic tax rate was 0.9 percent initially, then raised to 1.23 percent in 2012. Each region (and autonomous province) can increase the basic rate within the limits set by the national law by modifying its law, which is published in the Official Gazette no later than the 31st of December of the year preceding the one to which the tax refers.

The discipline of the regional additional income tax was substantially reformed by article 6 of Legislative Decree 68/2011, which established that any tax increase cannot be larger than 2.1 percentage points. Similarly to the municipal income tax, this reform established that regions can adopt a graduated tax scheme, where the tax rates must be articulated exclusively with the same income brackets established for the national income tax, as well as diversified and increasing with income. The regions can arrange tax deductions in favor of the family and also adopt measures of direct economic support. The regions can also set deductions from the regional income tax itself in the place where subsidies, vouchers, service vouchers and other social support measures provided for by regional legislation are provided.[1]

The regional surcharge is paid in a single solution to the region in which the taxpayer has his tax domicile on the 1st of January of the year in which the tax rate is applied. Revenue from the regional income tax is held by the regions and mostly contributes to financing the National Health Service (administered by the regions).

In the following, we list the laws concerning the income tax set by regions:

- Law 15 December 1997, n. 446, Article 50. *Istituzione dell'imposta regionale sulle attività produttive, revisione degli scaglioni, delle aliquote e delle detrazioni dell'Irpef e istituzione di una addizionale regionale a tale imposta, nonché riordino della disciplina dei tributi locali.*

- Law 4 December 1997, n. 460, Article 21. *Riordino della disciplina tributaria degli enti non commerciali e delle organizzazioni non lucrative di utilità sociale*

- Law 4 May 2001, n. 207, Article 4. *Riordino del sistema delle istituzioni pubbliche di assistenza e beneficenza, a norma dell'articolo 10 della L. 8 novembre 2000, n. 328.*

- Law 30 December 2004, n. 311, Article 1. *Disposizioni per la formazione del bilancio an- nuale e pluriennale dello Stato.*

- Law 27 December 2006, n. 296, Article 1. *Disposizioni per la formazione del bilancio an- nuale e pluriennale dello Stato*

- Law 1 October 2007 n. 159, Article 4.

- Law 5 May 2009, n. 42, Article 7. *Delega al Governo in materia di federalismo fiscale, in attuazione dell'articolo 119 della Costituzione.*

- Law 23 December 2009, n. 191, Article 2. *Disposizioni per la formazione del bilancio annuale e pluriennale dello Stato.*

- Law 31 May 2010, n.78, Article 11. *Misure urgenti in materia di stabilizzazione finanziaria e di competitività economica.*

[1] These tax exemption measures cannot be adopted by the regions involved in the recovery plans from the health deficit.

- Law 6 May 2011, n. 68, Articles 2 and 6. *Disposizioni in materia di autonomia di entrata delle regioni a statuto ordinario e delle province, nonché di determinazione dei costi e dei fabbisogni standard nel settore sanitario.*

- Law 6 December 2011 n. 201, Article 28. *Disposizioni urgenti per la crescita, l'equità e il consolidamento dei conti pubblici.*

- Law 29 December 2011, n. 216, Article 29. *Proroga di termini previsti da disposizioni legislative.*

- Law 22 June 2012, n. 83, Article 19 comma 9. *Possibilità per la regione Campania di destinare l' aumento dell'aliquota dell'addizionale regionale all'IRPEF previsto dall'art. 2, comma 86, della legge n. 191 del 2009 o anche il raddoppio dell'aumento stesso, alla copertura del Piano di rientro dal disavanzo nel settore del trasporto.*

- Law 6 July 2012, n. 95, Article 15. *Disposizioni urgenti per la revisione della spesa pubblica con invarianza dei servizi ai cittadini nonché misure di rafforzamento patrimoniale delle imprese del settore bancario.*

- Law 8 April 2013, n. 35, Article 3-ter. *Disposizioni urgenti per il pagamento dei debiti scaduti della pubblica amministrazione, per il riequilibrio finanziario degli enti territoriali, nonché in materia di versamento di tributi degli enti locali*

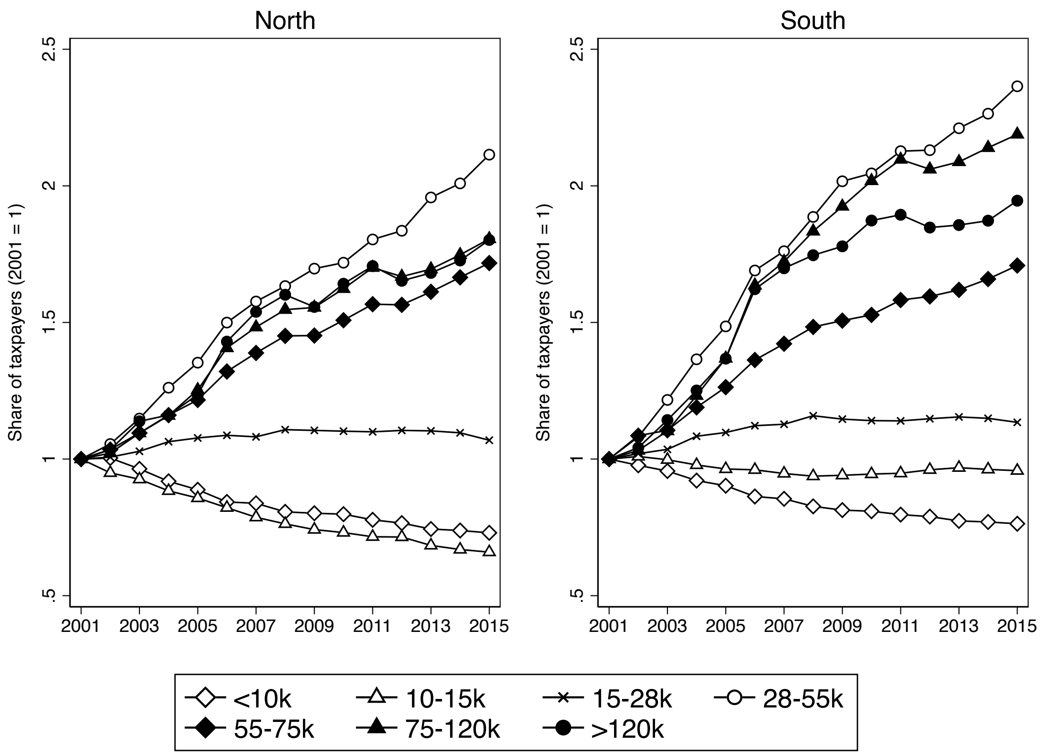
- Law 28 June 2013, n. 76, Article 11 comma 15. *Primi interventi urgenti per la promozione dell'occupazione, in particolare giovanile, della coesione sociale, nonché in materia di Imposta sul valore aggiunto (IVA) e altre misure finanziarie urgenti.*

- Law 21 November 2014, n. 175, Article 8 comma 1 and 4. *Semplificazione fiscale e dichiarazione dei redditi precompilata.*

C Data Appendix

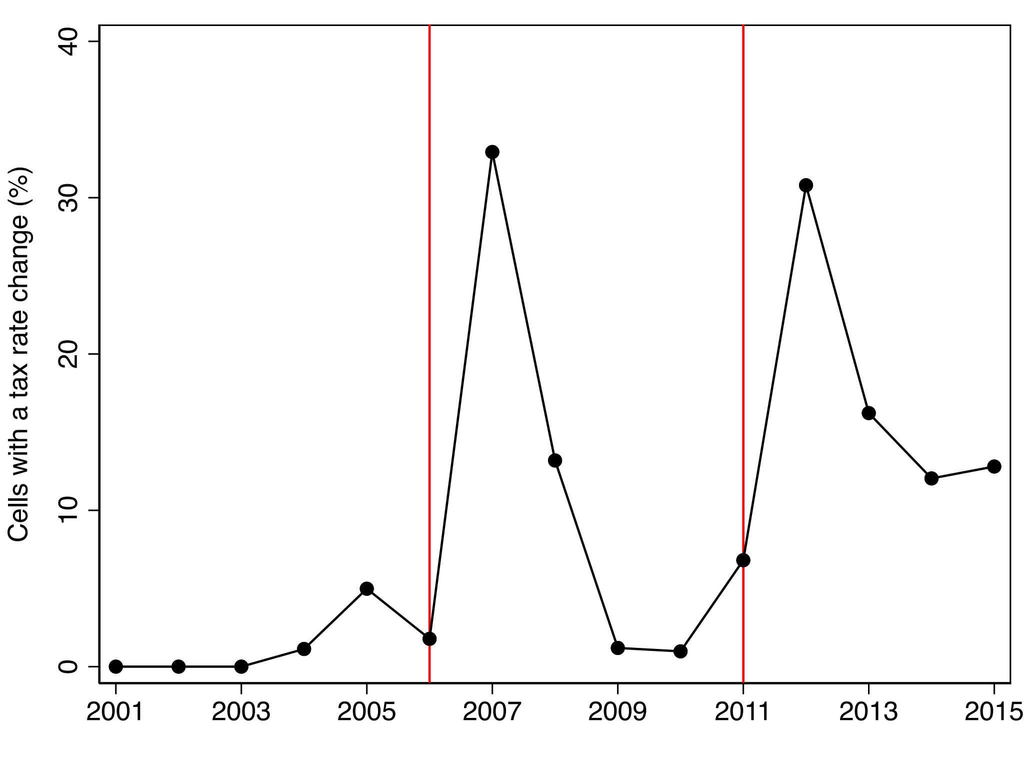
C.1 Aggregate Income Data and Tax Rates

Figure C1: Share of Taxpayers in Each Income Group



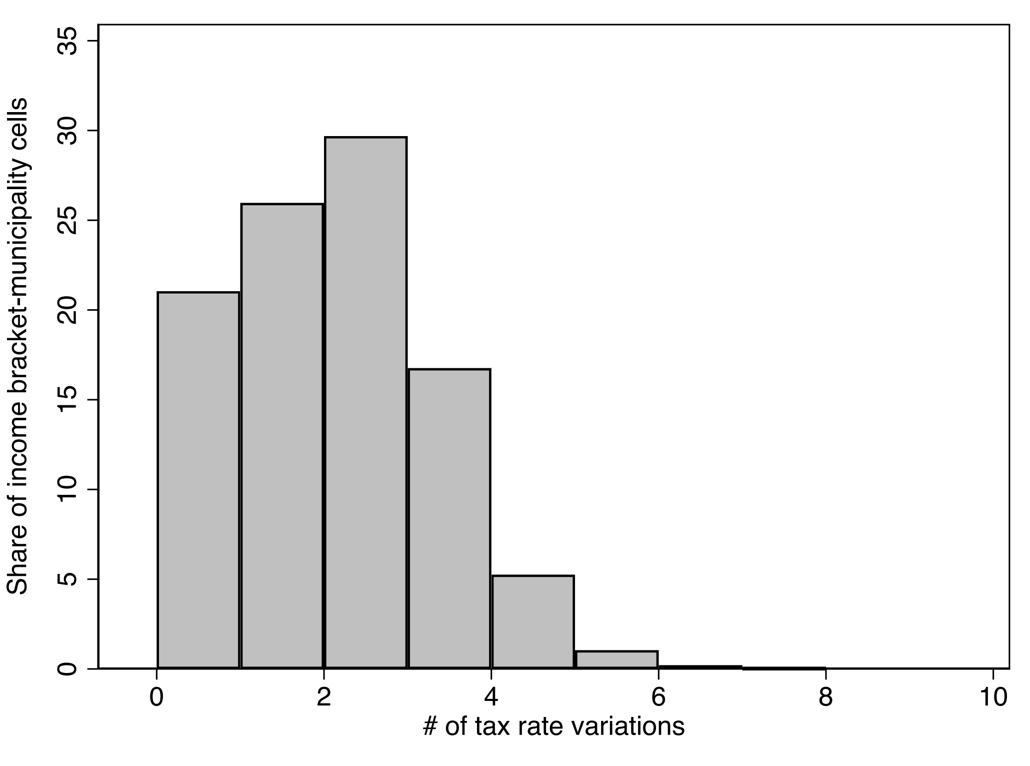
Note: The figure displays the evolution in the share of taxpayers in each income group in Northern Italy (left-hand side graph) and Southern Italy (right-hand side graph). Series are normalized to 1 in 2001.

Figure C2: Changes in the local tax rate



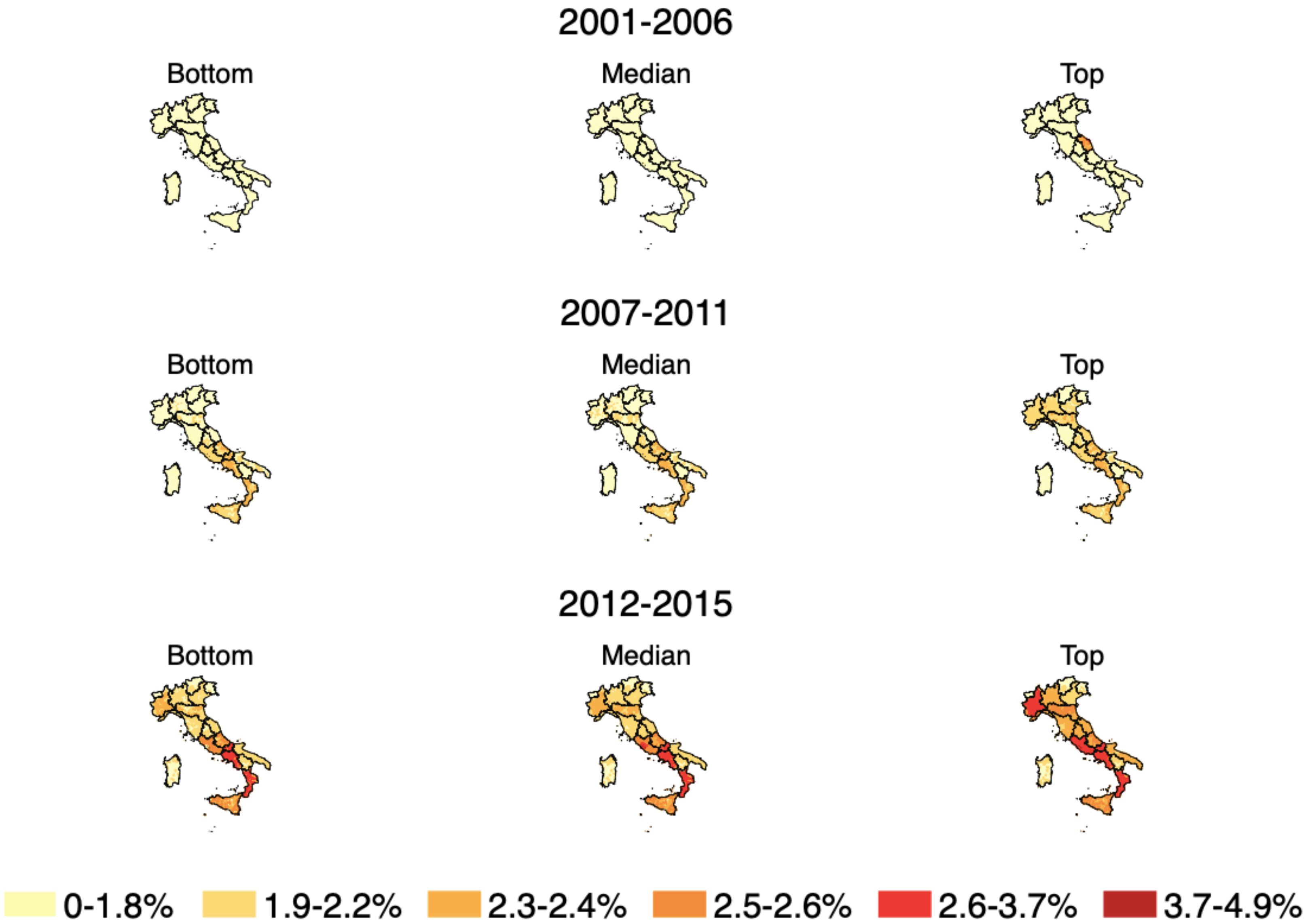
Note: The figure displays the evolution in the share of income bracket-municipality-year observations containing a tax rate change. Red vertical lines refer to the year before local governments were granted the possibility to implement a tax exemption cutoff (2006) and to set different tax rates across brackets (2011).

Figure C3: How many tax rate variations?



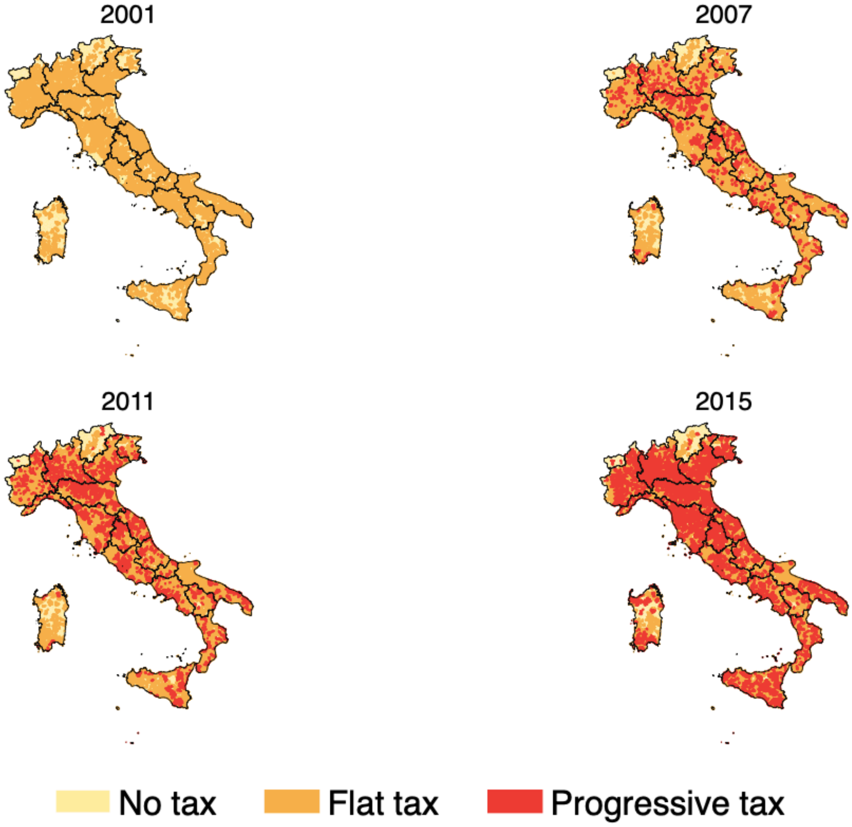
Note: The figure displays the share of income-bracket municipality cells (vertical axis) with a given number of tax rate change (horizontal axis) observed over the 2001-2015 period.

Figure C4: Local average tax rate by bracket



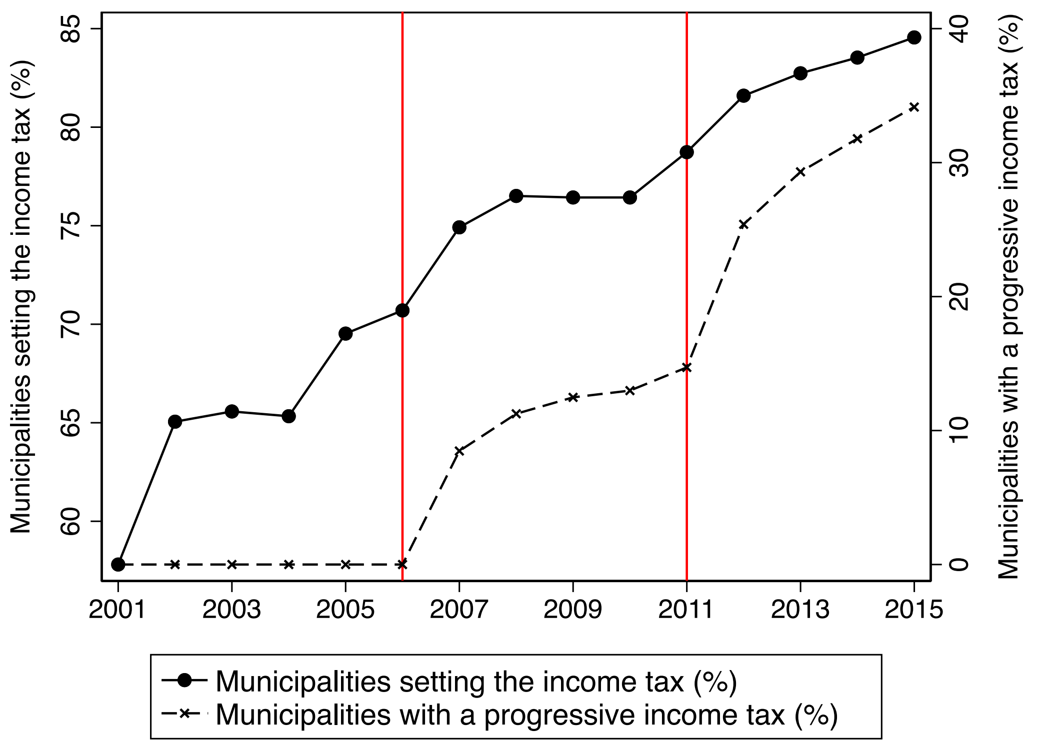
Note: This graph depicts the local average tax rate on personal income (%) for taxpayers in bottom, median and top income bracket. The black line indicates regional boundaries.

Figure C5: Municipality tax scheme



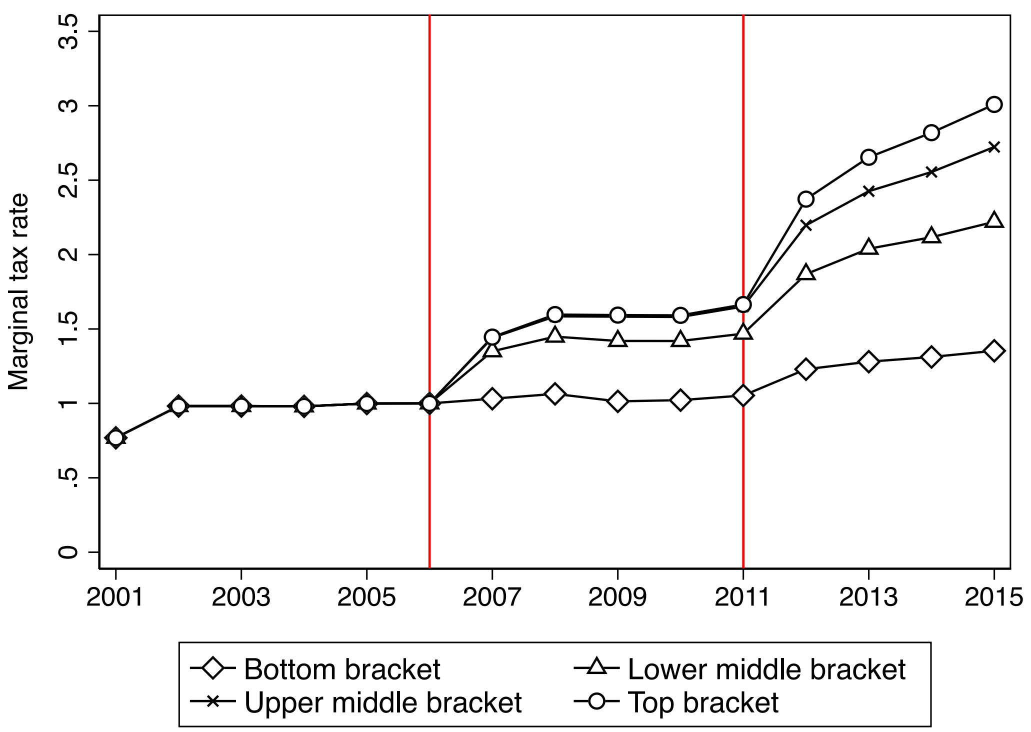
Note: The figure displays the evolution in the municipality tax scheme, by showing whether a municipality has set a tax rate on personal income and, if it did, whether it is a single flat rate or a progressive tax scheme (including both those with a tax exemption cutoff or graduated tax rates). The black line indicates regional boundaries.

Figure C6: Trend in municipal income taxation



Note: The figure displays the evolution in the share of municipalities with a nonzero income tax rate (left-hand side vertical axis) and in the share of municipalities with a graduated tax scheme (right-hand side vertical axis) over the 2001-2015 period. Red vertical lines refer to the year before local governments were granted the possibility to implement a tax exemption cutoff (2006) and to set different tax rates across brackets (2011).

Figure C7: Within-municipality cross-bracket tax rate variation



Note: The figure displays the evolution in the municipal marginal tax rate across income bracket over the 2001-2015 period for municipalities with a graduated tax rate. Red vertical lines refer to the year before local governments were granted the possibility to implement a tax exemption cutoff (2006) and to set different tax rates across brackets (2011). Data from the Italian Ministry of Economy and Finance.

Table C1: Tax base and stock of taxpayers data

Income group	Tax base (1,000 of 2015 euros)				Stock of taxpayers			
	mean	sd	min	max	mean	sd	min	max
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1-10,000	8,604	39,950	17	2,834,531	1,753	8,616	4	638,911
10,001-15,000	10,304	48,514	44	3,478,410	821	3,859	6	276,612
15,001-28,000	30,371	164,778	68	1.09e+07	1528	8192	3	545,725
28,001-55,000	27,536	224,610	108	1.84e+07	802	6,353	2	513087
55,001-75,000	6,921	66,598	223	4,944,214	109	1,044	9	77,506
75,001-120,000	8,056	80,449	0	5,743,228	88	873	0	62,438
120,001-	12,983	157,921	0	8,518,113	60	629	0	32,888

Note: For each income group, this table reports the tax base (columns 1-4) and the stock of taxpayers (columns 5-8) as reported in tax returns. The tax base is converted in 2015 thousand of euros. Tax returns data covering 7,918 municipalities averaged over the 2001-2015 period.

Table C2: Local statutory marginal tax rate on personal income in Italian cities

City	Year: 2001			Year: 2011			Year: 2015		
	Low	Middle	Top	Low	Middle	Top	Low	Middle	Top
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Rome	0.900	0.900	0.900	1.400	1.400	1.400	1.730	4.230	4.230
Milan	0.900	0.900	0.900	1.200	1.400	1.400	1.230	2.530	2.530
Naples	1.300	1.300	1.300	1.900	1.900	1.900	2.030	2.830	2.830
Turin	1.000	1.000	1.000	0.900	1.900	1.900	1.620	3.550	4.130
Palermo	0.900	0.900	0.900	1.800	1.800	1.800	2.530	2.530	2.530
Genua	1.170	1.170	1.170	1.370	1.870	1.870	1.230	3.110	3.130
Bologna	1.100	1.100	1.100	1.100	2.000	2.100	1.330	2.830	3.130
Florence	1.000	1.000	1.000	1.200	1.200	1.200	1.420	1.880	1.930
Bari	1.300	1.300	1.300	1.400	1.400	1.400	1.330	2.510	2.530
Catania	0.900	0.900	0.900	1.600	1.600	1.600	1.730	2.530	2.530
Verona	1.100	1.100	1.100	1.200	1.700	1.700	1.230	2.030	2.030
Venice	0.900	0.900	0.900	0.900	1.400	1.400	1.230	2.030	2.030
Messina	1.400	1.400	1.400	2.200	2.200	2.200	2.530	2.530	2.530
Padua	1.100	1.100	1.100	0.900	2.000	2.000	1.230	1.930	1.930
Trieste	0.900	0.900	0.900	1.700	1.700	1.700	0.700	2.030	2.030
Brescia	0.900	0.900	0.900	1.200	1.400	1.400	1.230	2.530	2.530
Parma	1.100	1.100	1.100	1.100	1.300	1.400	1.330	2.830	3.130
Taranto	1.300	1.300	1.300	1.700	1.700	1.700	1.330	2.510	2.530
Prato	1.200	1.200	1.200	1.400	1.400	1.400	1.920	2.180	2.230
Modena	0.900	0.900	0.900	1.600	1.800	1.900	1.830	2.550	3.130
Reggio C.	0.900	0.900	0.900	1.400	1.400	1.400	2.530	2.530	2.530
Reggio E.	1.100	1.100	1.100	1.300	1.500	1.600	1.330	2.520	3.130
Perugia	0.900	0.900	0.900	0.900	1.800	1.800	1.230	2.480	2.630
Ravenna	0.900	0.900	0.900	1.700	1.900	2.000	1.880	2.600	3.130
Livorno	1.100	1.100	1.100	1.300	1.300	1.300	2.220	2.480	2.530

Note: This table displays the local marginal tax rate on personal income (summing up the regional and municipal rate) in low, middle and top bracket for the 20 largest Italian cities.

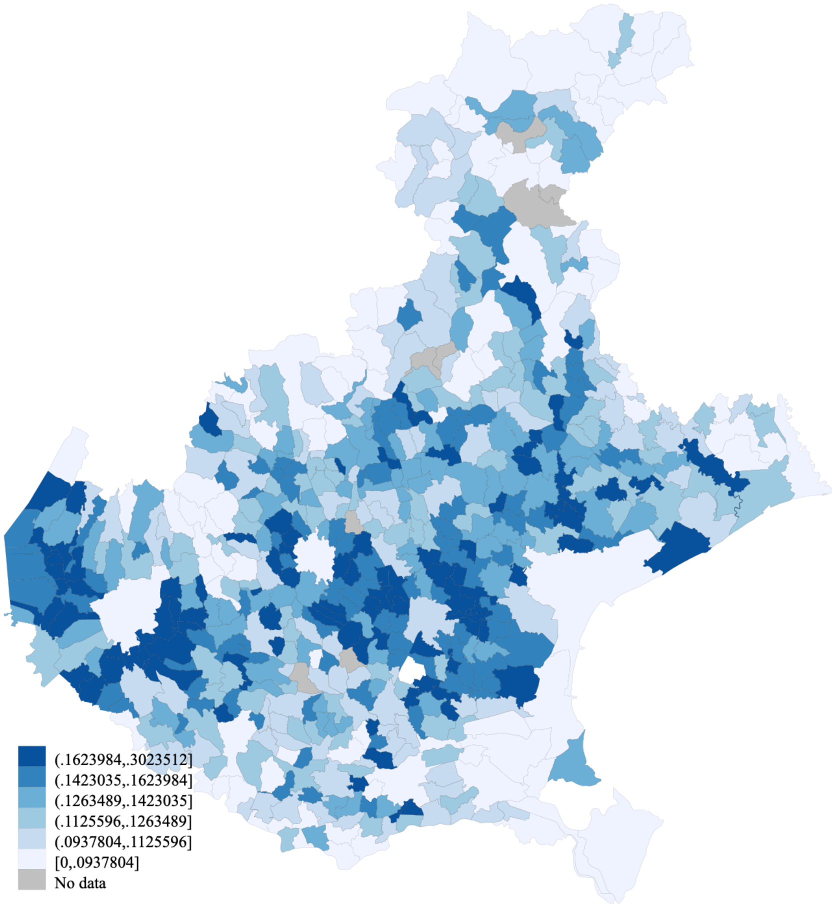
C.2 Individual Tax Return Data

Table C3: Descriptive Statistics of Individual Tax Returns Data

	All taxpayers		Movers		Non-movers	
	Average	SD	Average	SD	Average	SD
Gross income (euros)	20,892.3	28,292.6	20,038.1	26,735.2	21,018.2	28,512.7
Taxable income (euros)	20,021.7	27,420.0	19,333.8	25,946.9	20,123.1	27,629.0
Net income (euros)	16,734.2	17,164.4	16,119.7	16,255.7	16,824.7	17,292.4
Income tax burden (euros)	3,838.1	10,980.3	3,616.3	10,368.4	3,870.8	11,067.2
Self-employed (%)	.10	.30	.09	.29	.10	.30
Employee (%)	.55	.49	.76	.42	.52	.49
Retiree (%)	.34	.47	.14	.34	.37	.48
Home owners (%)	.59	.49	.48	.49	.60	.48
Age	51.5	18.6	41.5	16.2	53.0	18.4
Female (0/1)	.46	.49	.45	.49	.46	.49
Ever married (0/1)	.51	.49	.41	.49	.53	.49
Foreign (0/1)	.10	.30	.20	.40	.09	.28
Observations	26,355,733		3,384,963		22,970,770	

Note: The variable *Mover* captures the taxpayers that change residence at least once over the period in analysis.

Figure C8: Share of Movers Across Veneto's Municipalities



Note: This figure depicts the share of taxpayers that are classified as "mover" in each municipality in Veneto. A taxpayers is defined as 'mover" if she changed her municipality of residence at least once over the period observed in our data (2007-2014).

Table C4: Outflow of individuals, selected municipality pairs

Origin municipality:	Destination municipality:									
	Verona	Venezia	Padova	Vicenza	Treviso	Rovigo	Chioggia	Bassano del Grappa	San Doná di Piave	Schio
Verona	.	124	193	141	45	21	15	27	14	37
Venezia	140	.	679	135	440	47	273	52	242	30
Padova	215	538	.	263	164	136	120	81	38	40
Vicenza	165	131	247	.	37	8	13	115	14	134
Treviso	39	340	175	47	.	13	12	20	40	5
Rovigo	37	43	177	19	13	.	17	6	6	8
Chioggia	12	274	123	13	17	18	.	3	1	4
Bassano del Grappa	31	37	87	97	23	6	3	.	4	20
San Doná di Piave	18	212	59	6	65	5	4	3	.	1
Schio	36	24	52	161	6	4	5	32	3	.

Note: This table shows the outflow of individuals moving from an origin municipality (first column) to a destination municipality (columns 2-11) over the 2007-2014 period within the 10 most populated municipalities in the region of Veneto.

C.3 Transfers of Tax Residence

Table C5: Average annual outflow of individuals, selected province pairs

Origin province:	Destination province: RM	MI	NA	TO	PA	BS	BA	CT	BG	SA	FI	BO	PD	CE	VR	VA	TV	VI	VE	GE
RM	49,047	1,629	1,040	605	326	242	325	247	182	419	471	416	240	403	261	218	252	161	236	239
MI	1,283	51,998	652	684	379	726	334	277	2,134	249	301	327	235	156	309	3,846	194	166	213	615
NA	2,949	1,919	45,726	560	151	375	174	96	272	2,504	654	838	191	5,582	282	330	233	177	275	251
TO	582	888	258	50,234	240	136	137	168	125	149	129	156	89	116	123	176	84	69	95	268
PA	638	806	144	362	16,629	140	53	251	158	46	190	275	92	58	143	176	93	110	110	138
BS	243	677	225	146	98	25,472	89	68	1,174	68	66	93	94	66	410	90	57	88	82	68
BA	704	878	135	238	53	136	10,791	34	95	53	121	264	97	53	120	110	92	84	109	50
CT	446	589	70	260	209	103	38	19,267	109	30	95	164	84	26	110	135	79	60	63	63
BG	163	1,578	144	114	100	1,269	55	70	22,971	62	46	63	49	49	89	132	41	46	44	66
SA	1,013	653	1,757	238	51	131	48	31	93	12,718	177	299	76	148	84	131	74	53	63	80
FI	426	329	240	107	150	50	54	59	43	74	15,465	233	59	66	56	51	39	34	54	67
BO	379	405	322	129	175	70	119	83	54	133	194	18,987	106	126	97	54	63	55	86	60
PD	215	294	96	86	47	81	43	40	48	32	63	122	16,983	34	319	42	726	1,146	1,697	35
CE	938	487	3,237	204	53	120	60	24	86	146	196	281	68	12,779	101	135	97	56	86	69
VR	212	340	160	104	95	387	63	68	85	35	55	106	313	56	18,379	48	112	560	129	42
VA	191	2,857	154	130	104	103	61	85	128	66	46	55	48	57	51	17,764	36	36	37	77
TV	224	229	120	77	65	71	48	44	43	40	60	89	832	58	134	42	17,345	625	1,674	31
VI	174	221	112	66	85	94	48	39	51	31	43	80	1,196	33	628	36	581	17,297	256	29
VE	205	252	137	82	69	62	52	37	40	25	58	104	1,756	46	150	43	1,832	258	10,225	34
GE	232	645	114	256	105	63	34	43	58	33	76	62	37	28	45	76	24	22	41	9,433

Note: This table shows the average annual outflow of individuals moving from an origin province (first column) to a destination province (columns 2-20) over the 2007-2015 period within the following 20 most populated provinces: Rome (RM), Milan (MI), Naples (NA), Turin (TO), Palermo (PA), Brescia (BS), Bari (BA), Catania (CT), Bergamo (BG), Salerno (SA), Florence (FI), Bologna (BO), Padua (PD), Caserta (CE), Verona (VE), Varese (VA), Treviso (TV), Vicenza (VI), Venice (VE), and Genua (GE). The full dataset covers 11,932,720 transfers of residence moving within 107 $\times$ 107 = 11,449 province pairs over the 2007-2015 period.

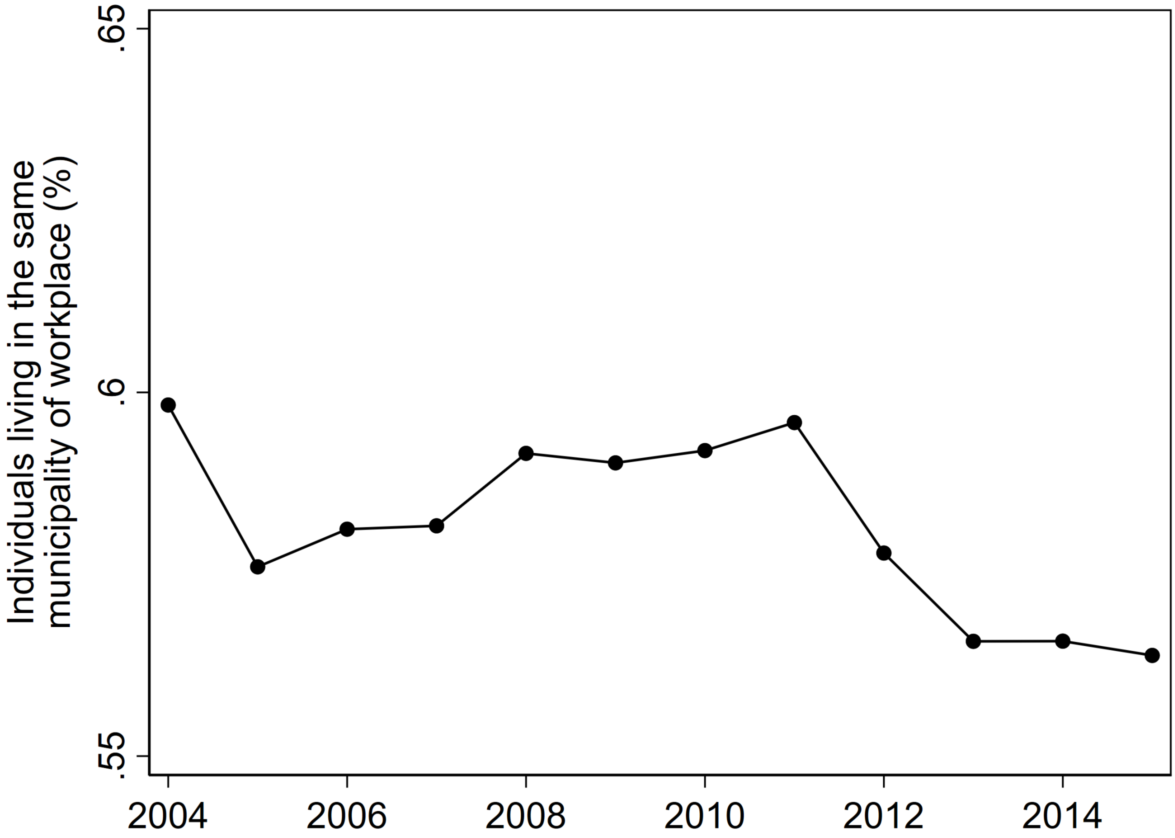
C.4 Labor Force Survey Data

Table C6: Descriptive Statistics of Labor Force Survey Data

	N of individuals (1)	Average (2)	SD (3)
Workplace in the same municipality (0/1)	2,555,672	0.582	0.493
Workplace in the same province (0/1)	2,555,672	0.333	0.471
Workplace in the same region (0/1)	2,555,672	0.059	0.236
Workplace in other region (0/1)	2,555,672	0.025	0.156
Single (0/1)	2,555,672	0.299	0.458
Married (0/1)	2,555,672	0.608	0.488
Separated de facto (0/1)	2,555,672	0.014	0.118
Separated legally (0/1)	2,555,672	0.030	0.171
Divorced (0/1)	2,555,672	0.029	0.167
Widow or widower (0/1)	2,555,672	0.020	0.138
Age	2,555,672	45.480	3.313
Female (0/1)	2,555,672	0.421	0.494
Primary and middle school (0/1)	2,555,672	0.332	0.471
High school (0/1)	2,555,672	0.392	0.488
College degree (0/1)	2,555,672	0.121	0.327

Note: This table reports summary statistics of the labor force survey data.

Figure C9: Trends in the Share of Taxpayers Working in the Same Municipality of Residence



Note: This figure depicts the trend in the share of individuals living in the same municipality of workplace. Data from the Italian labor force survey over the 2004-2015 period.

D Robustness Checks and Alternative Specifications

D.1 Progressive Tax Reform Event Study: Aggregate Evidence

In this appendix, we leverage cross-municipality variation in the timing of the implementation of a graduated tax scheme to study the impact on the tax base. We first split municipalities according to their local tax scheme:

$$i \in \begin{cases} Flat & \text{if } \tau_b = \tau_{b-1} \qquad\qquad \forall \tau_b \in T_i(b_1, ..., b_7) \\ Prog & \text{otherwise,} \end{cases} \tag{15}$$

so that municipality i belongs to the progressive tax group if it exists at least a single marginal tax rate in the tax schedule $T_i(b_1, ..., b_7)$ such that $\tau_b > \tau_{b-1}$.

Then, we compare cross-municipality variation in the tax base in the year before and after the local tax scheme switch. This exercise allows us to assess whether the tax base in these two groups of municipalities followed a similar trend before the tax scheme switch, but diverged afterwards. Formally, we run an event-study specification of the following form:

$$log(y_{i,t}) = \sum_{j \neq -1} \beta_j \cdot 1(i \in Prog) \cdot 1(t = t_j) + \gamma_i + \delta_t + u_{i,t}, \tag{16}$$

where $y_{i,t}$ denotes the tax base in municipality i at year t. The interaction between a dummy for municipalities with a progressive tax schedule and years, $1(i \in Prog) \cdot 1(t = t_j)$, omits the year before the local tax scheme switch (denoted by $j = -1$), so that the coefficient β_j can be interpreted as the effect at year t relative to the year before the local tax scheme change. In the absence of differential pre-existing trends, $\beta_j = 0$ $\forall j < -1$. By contrast, for $j > -1$, the coefficients β_j show the dynamic effects of implementing a progressive tax schedule on the tax base. γ_i and δ_t are municipality and year fixed effects, respectively. In some specifications, we also include province or local labor market $\times$ year fixed effects to account for any local shocks or policies. We cluster the standard errors at the municipality level. We model potential heterogeneous treatment effects by weighting regressions for the municipal population (averaged over the period of interest).[2]

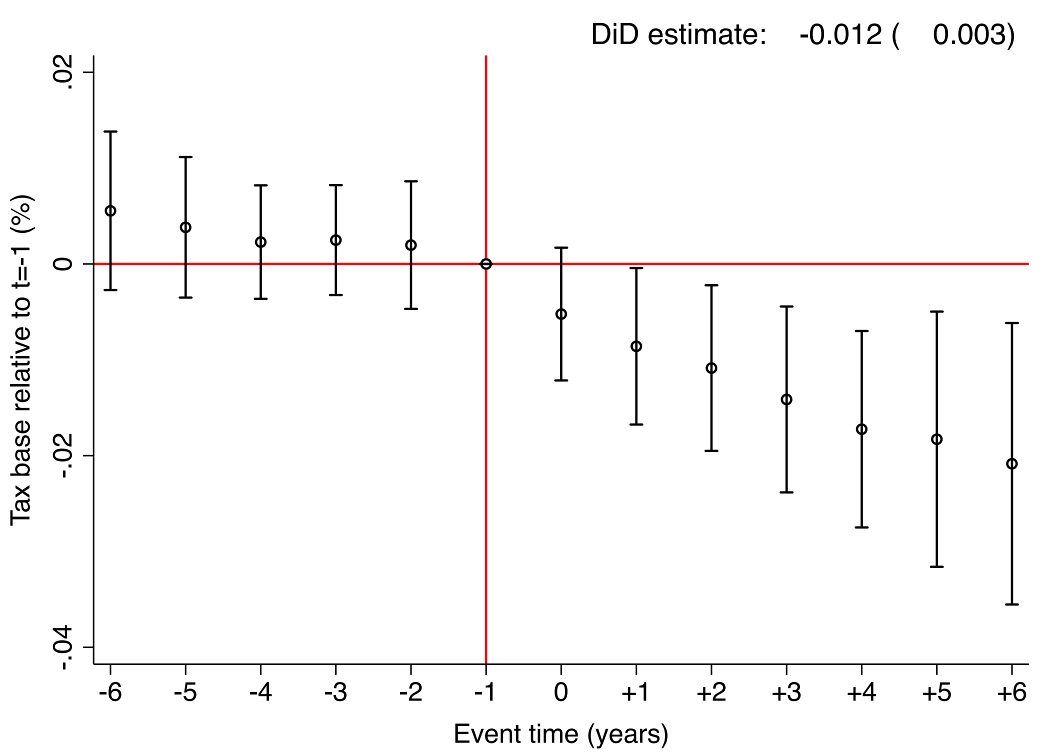
The results are presented in Figure D1, which reports β_j estimates and 95 percent confidence intervals for up to 6 years before and after the local tax scheme switch.[3] The graph shows that the difference in taxable income between progressive and flat tax municipalities was not significant when measured during the period before municipalities were allowed to switch to the progressive tax scheme, thus validating the

[2] Estimates are not sensitive to alternative weighting strategies (e.g., by weighting for the average municipal tax base) or by running unweighted regressions.

[3] We limit the effect window in the range of 6 years before and after the progressive tax reform by binning at the endpoint. This choice has little impact in practice (see Figure D4.

parallel trends assumption. Then, a gradual drop in the tax base emerged, persistent up to 6 years after the implementation of a progressive tax schedule. In interpreting these results, note that the β_j estimate is a combination of both intensive margin and extensive margin effects.

Figure D1: The Impact of Progressive Tax Reforms



Note: The figure depicts the impact of switching from a flat to a progressive local income tax schedule. The figure plots coefficient estimates and the 95 percent confidence intervals: each point shows the effect of having implemented a progressive tax schedule for j years (if j >-1) or of starting the policy in j years (if j < -1) relative to the year before the tax scheme switch was implemented. Regressions include municipality fixed effects and year fixed effects. The sample includes 7,918 municipalities over the 2001-2015 period. Regressions weighted by the average municipal population. Standard errors clustered at the municipality level.

Coefficient and standard errors estimates are reported in Table D1, where we estimate standard difference-in-differences (DiD) specifications by interacting the dummy for municipalities with a progressive tax with a dummy for the period after the local tax scheme switch. The baseline model with municipality and year fixed effects shows that switching to a progressive tax scheme reduced the mean tax base by 1.2 percent. This translates in an average reduction of around 1,123 thousand euros per-municipality.

We investigate the robustness of this effect in the rest of the table. First, we control for province $\times$ year fixed effects (column 2) and local labor market $\times$ province $\times$ year fixed effects (column 3). The point estimates remain substantially similar. In column (4), we show that the impact is robust to including several socio-economic, political, and demographic municipality-specific controls.[4] Finally, column (5) shows that the

[4]We include the following control variables: property tax rates on main dwelling and second homes, the

progressive tax reform effect survives also to control for the average tax burden in a municipality. Moreover, in Figure D2, we show that our results remain qualitatively similar when we exploit "within-treated" variation in the timing of switching to a progressive tax schedule (i.e., by exclusively leveraging variation among municipalities that will eventually implement a graduated tax schedule).

Table D1: Local Tax Scheme and Local Tax Base

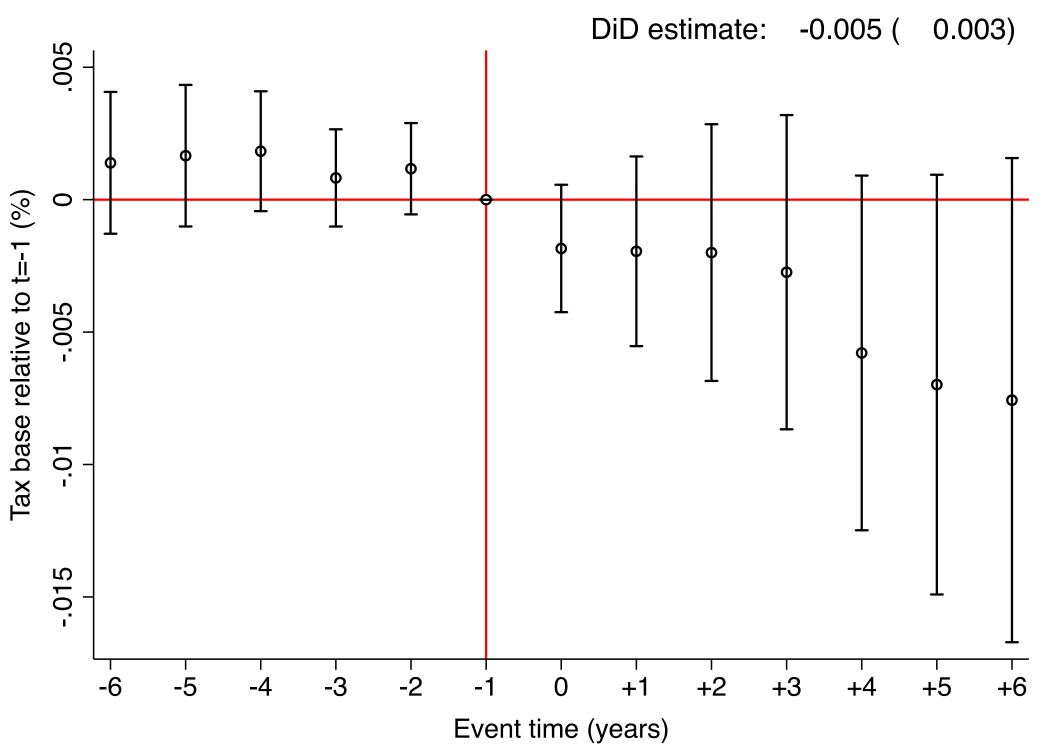
	log(tax base)				
	(1)	(2)	(3)	(4)	(5)
$1(i \in Prog) \cdot 1(t \in Post)$	-0.012***	-0.014***	-0.016***	-0.012***	-0.012***
	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)
log(1-ATR)					0.468
					(0.554)
Observations	118,770	118,770	118,770	118,770	118,770
Municipality FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Province × year FE	No	Yes	Yes	Yes	Yes
LLM × province × year FE	No	No	Yes	Yes	Yes
Controls	No	No	No	Yes	Yes
Tax rate	No	No	No	No	Yes
Tax base (€1,000)	93,659	93,659	93,659	93,659	93,659

Note: This table shows the effect of switching from a flat to a progressive income tax. The sample is composed of 7,918 municipalities over the 2001-2015 period. Regressions weighted by the average municipal population. Column (4) includes the following controls: property tax rates on main dwelling and on second homes, share of population above 65, share of population below 15, a dummy for fiscal deficit, election-year fixed effects, gender, education attainment and age of mayor and each member of the town council, municipal public spending share in administration, development, law and order, education, and social welfare. Column (5) controls for the municipal average tax burden. Standard errors clustered at the municipality-level in parentheses.

The presence of negative weights might affect the computation of the treatment effects. In our context, negative weights arise because the coefficient estimate is a weighted sum of several DiD, each comparing the evolution of the outcome variable between consecutive time periods across pairs of municipalities. Given the staggered adoption of the progressive tax, the "control" group in some of the comparisons would become treated at a later period. Then, its treatment effect at a later period gets

share of population above 65, the share of population below 15, a dummy for fiscal deficit, election-year fixed effects, gender, education attainment and age of mayor and each member of the town council, municipal public spending share in administration, development, law and order, education, and social welfare. Because these variables are likely endogenous to local income tax rates, we prefer not to include them in the baseline specification, but rather verify that the coefficient estimate is not sensitive to their inclusion.

Figure D2: The Impact of Progressive Tax Reforms: "Within-treated" Analysis

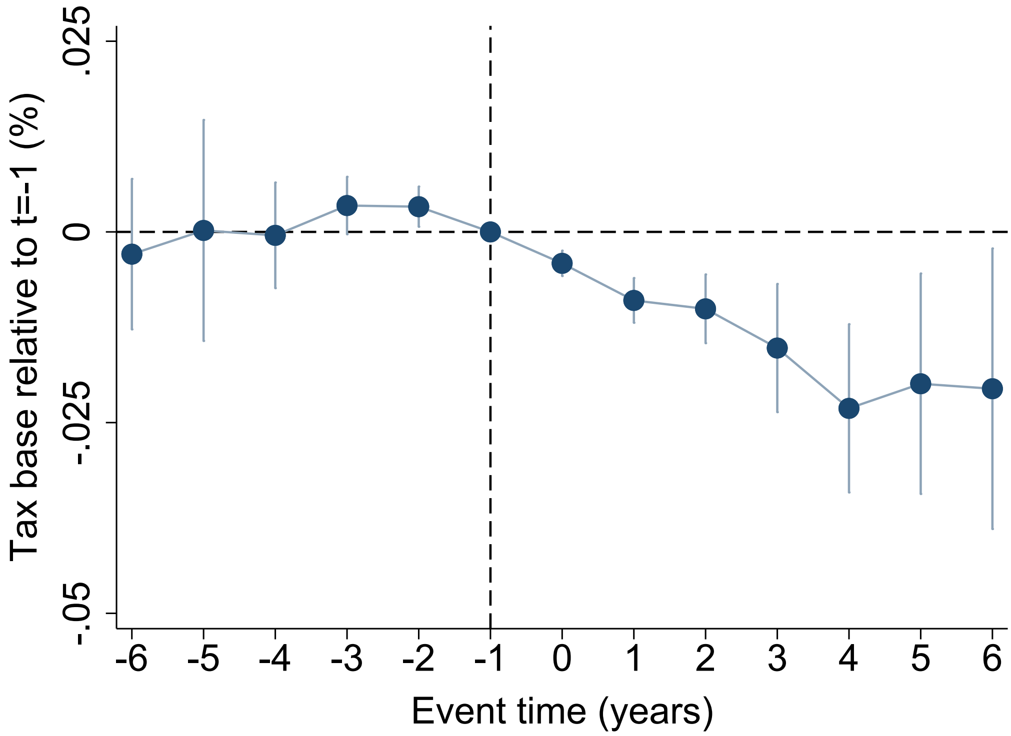


Note: The figure depicts the impact of switching from a flat to a progressive local income tax schedule among municipalities that would eventually switch to a progressive tax schedule. The figure plots coefficient estimates and the 95 percent confidence intervals: each point shows the effect of having implemented a progressive tax schedule for j years (if j >-1) or of starting the policy in j years (if j < -1) relative to the year before the tax scheme switch was implemented. Regressions include municipality fixed effects and year fixed effects. The sample includes 7,918 municipalities over the 2001-2015 period. Regressions are weighted by the average municipal population. Standard errors clustered at the municipality-level.

differenced out, thus generating the negative weights. Following the methodology developed by de Chaisemartin and D'Haultfoeuille (2020) (using the stata program "didmultiplegt"), we test the sensitivity of our estimates to the presence of negative weights. Appendix Figure D3 shows that our event-study coefficient estimates remain substantially similar when we implement the de Chaisemartin and D'Haultfoeuille (2020)'s estimator. This provides reassuring evidence that negative weights are not a meaningful source of bias in our context.

The change from flat to progressive rates might involve different tax rate changes. The measured effect documented above is, therefore, the response to potentially heterogeneous treatment effects. To account for this treatment heterogeneity, we implement a 2SLS model where we regress the log of the tax base on the log of the net-of-average marginal tax rate instrumented by the progressive tax reform. In this way, we can present our effects in terms of elasticity estimate and exploit the variation in the local tax rate that is solely generated by adopting a progressive tax. We present these results in Table D2, which reports the 2SLS elasticity estimates. Our baseline specifica-

Figure D3: The Impact of Progressive Tax Reforms Using the de Chaisemartin and D'Haultfoeuille (2020) Estimator



Note: The figure depicts the impact of switching from a flat to a progressive local income tax schedule using the methodology developed by de Chaisemartin and D'Haultfoeuille (2020) (and using the stata program "didmultiplegt"). The figure plots coefficient estimates and the 95 percent confidence intervals: each point shows the effect of having implemented a progressive tax schedule for j years (if j >-1) or of starting the policy in j years (if j < -1) relative to the year before the tax scheme switch was implemented. Regressions include municipality fixed effects and year fixed effects. The sample includes 7,918 municipalities over the 2001-2015 period. Standard errors clustered at the municipality level.

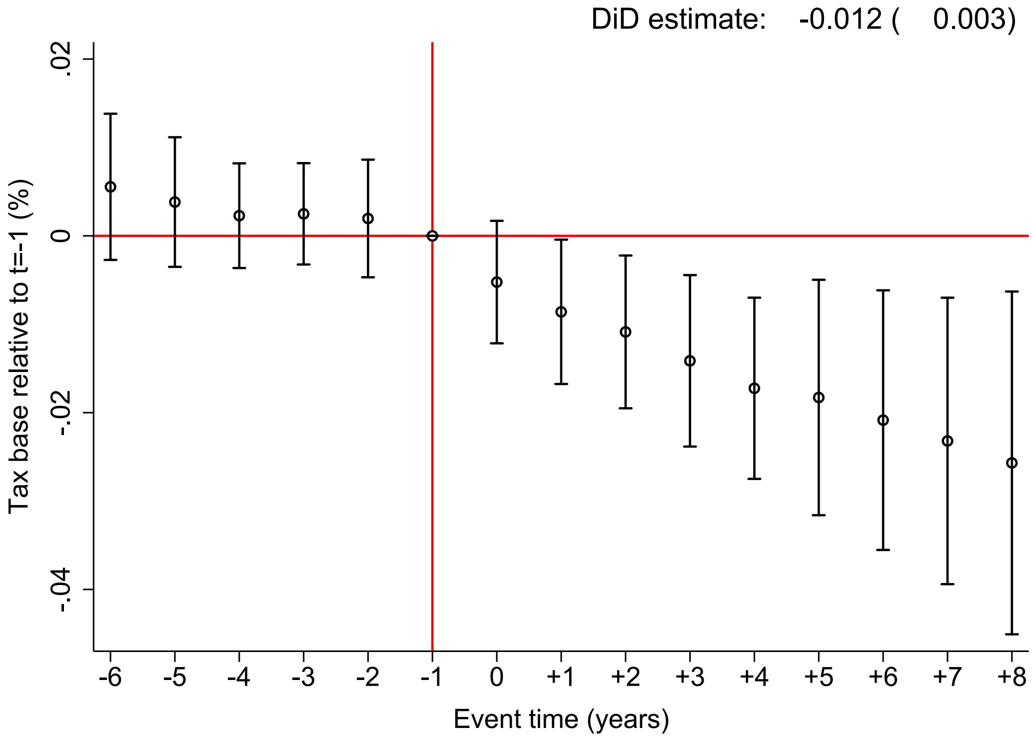
tion reports an elasticity of 0.533, which is statistically significant at usual confidence intervals. As previously noted, this elasticity is a combination of both intensive and extensive margin responses and lies in the range of the existing estimates (Saez et al. 2012).

Table D2: Aggregate Tax Base Elasticity

	log(tax base)			
	(1)	(2)	(3)	(4)
$log(1-\tau_{m,t})$	0.533***	0.656***	0.800***	0.632***
	(0.156)	(0.120)	(0.126)	(0.115)
Observations	118,770	118,770	118,770	118,770
Municipality FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Province × year FE	No	Yes	Yes	Yes
LLM × province × year FE	No	No	Yes	Yes
Controls	No	No	No	Yes
Tax base (€1,000)	93,659	93,659	93,659	93,659

Note: This table shows the results from a 2SLS model where we regress the log of the tax base on the log of the net-of-average marginal tax rate instrumented by the progressive tax reform. The sample is composed of 7,918 municipalities over the 2001-2015 period. Regressions are weighted by the average municipal population. Column (4) includes the following controls: property tax rates on main dwelling and second homes, the share of population above 65, the share of population below 15, a dummy for fiscal deficit, election-year fixed effects, gender, education attainment, and age of mayor and each member of the town council, municipal public spending share in administration, development, law and order, education, and social welfare. Standard errors clustered at the municipality level are in parentheses.

Figure D4: The Impact of Progressive Tax Reforms, No Binning at the Endpoint



Note: The figure depicts the impact of switching from a flat to a progressive local income tax schedule without binning at the endpoint. The figure plots coefficient estimates and the 95 percent confidence intervals: each point shows the effect of having implemented a progressive tax schedule for j years (if j >-1) or of starting the policy in j years (if j < -1) relative to the year before the tax scheme switch was implemented. Regressions include municipality fixed effects and year fixed effects. The sample includes 7,918 municipalities over the 2001-2015 period. Regressions weighted by the average municipal population. Standard errors clustered at the municipality level.

D.2 Progressive Tax Reform Event Study: Cross-Bracket Evidence

Another threat to our research design is the possibility that the decision to implement a graduated local tax scheme reflected a municipality-by-bracket-specific shock or underlying trends. For example, if a negative shock hits rich taxpayers in a given municipality, local policymakers could react by changing the local tax schedule to mitigate the negative impacts of the shock. To assess such a possibility, we propose an event-study analysis comparing the evolution of the tax base across different income classes within a municipality.

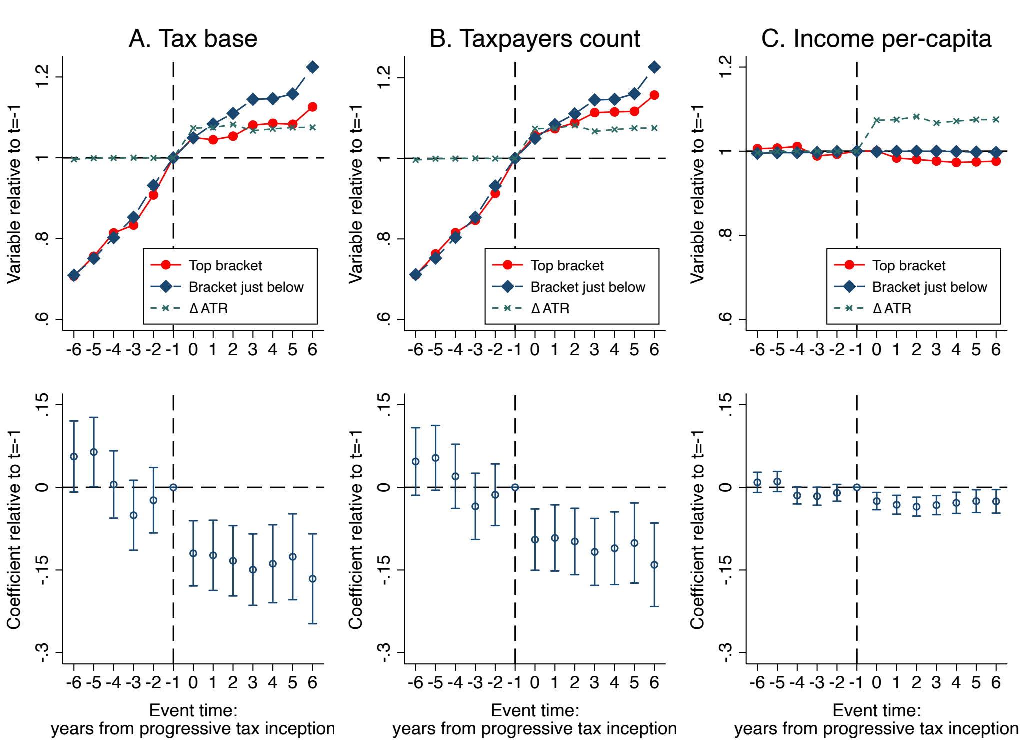
We focus on top incomes to compare the evolution in the tax base stock of taxpayers between the top income class (those reporting more than 120,000 euros) and the income group just below (reporting between 75,000 and 120,000 euros). Although implementing a progressive tax is likely to affect taxpayers in both groups, we expect taxpayers in the top income class to be relatively more affected than those in the bracket just below.

The top panel in Figure D5 shows the evolution in the total tax base (panel A), the population stock (panel B) and income per-capita (panel C) in the top income class (red circles) versus the income class just below (blue diamonds). The two series are normalized to match in the year before the implementation of a graduated tax scheme. We also report the difference in the average tax rate over time between the two income groups (which is 0 over the years with a flat tax scheme). Three key insights emerge from this figure. First, the two groups were on a parallel trend over the six years leading up to the reform, whereas they started diverging immediately after implementing a progressive tax scheme.[5] Second, tax base and population stock differences between the two groups are gradually increasing over time, which is consistent with the results relying on cross-municipality variation. Third, the fact that the evolution in the tax base mirrors the population stock trend suggests that most of the response takes place over the extensive (mobility) margin. This result corroborates our main evidence presented in section 4.1.

In the bottom panel, we report coefficient estimates and 99 percent confidence intervals obtained from an event-study research design, which controls for income group and year fixed effects. The figure provides clear evidence of a negative drop in the aggregate tax base observed in the top income group. On average, we find that the top income class experienced a reduction by around 13 percent compared to the income class just below. This pattern is mainly a consequence of a lower stock of taxpayers in the top income group. The "intensive margin" response, proxied by the effects on

[5]The upward-sloping pattern in these graphs (common for both the two groups) is driven by the aforementioned "bracket creep": inflation leads taxpayers to "creep" to higher income brackets. Since we are not comparing income classes that refer to income brackets, we expect the extent of tax-induced cross-bracket movements to be limited, if any. In fact, if some taxpayers bunch at the top bracket cutoff of 75,000 euros, the β estimate would be conservative because the taxpayers count in the control group - the 75,000-120,000 euros income class - would have been *larger* in the absence of bunching.

Figure D5: The impact of implementing a progressive tax schedule



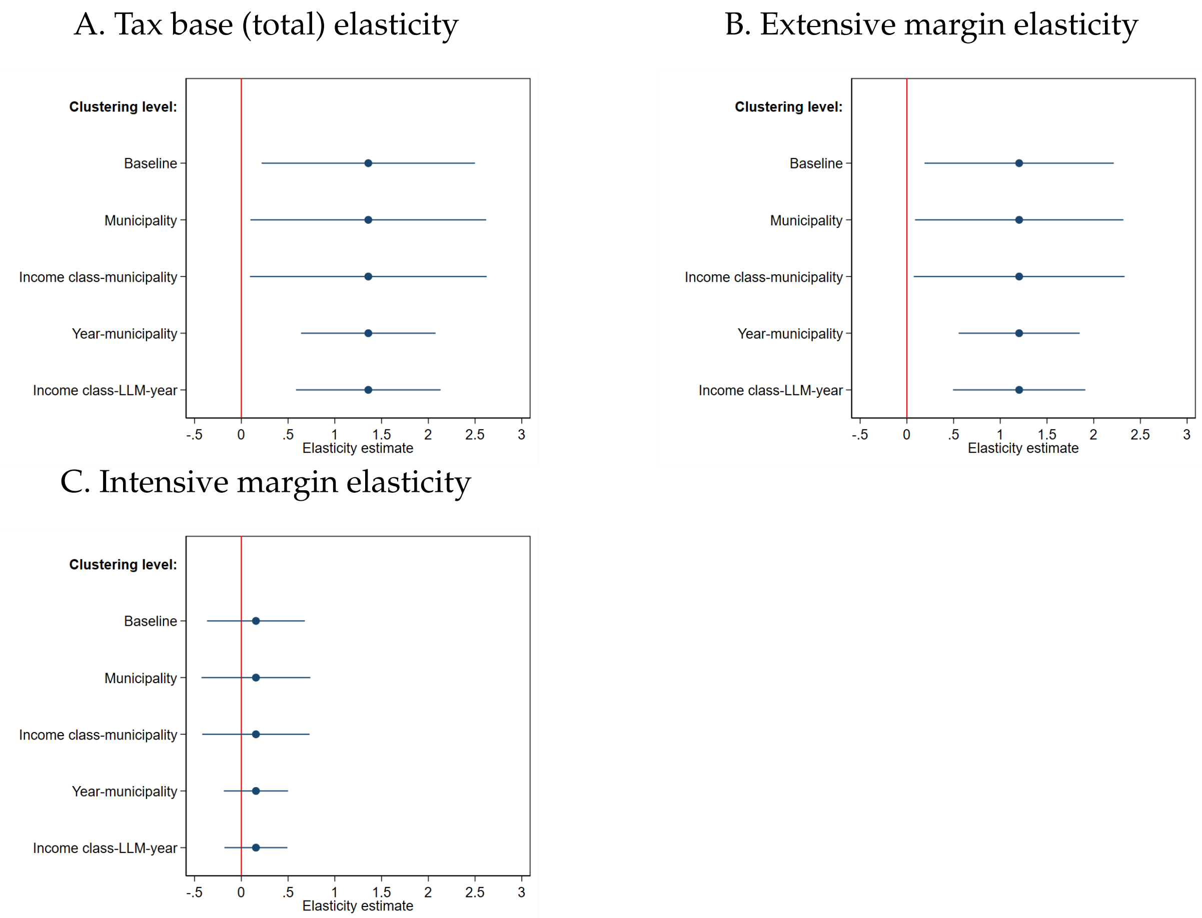
Note: The top panel shows the evolution in the total tax base (panel A), the population stock (panel B) and income per-capita (panel C) in the top income class (taxpayers reporting more than 120,000 euros; red circles) versus the income class just below (taxpayers reporting between 75,000 and 120,000 euros; blue diamonds). The two series are normalized to match in the year before the implementation of a graduated tax scheme. We also report the difference in the average tax rate over time between the two income groups (which is obviously 0 over the years with a flat tax scheme). The dashed vertical line refers to the year before a municipality switched from a flat to a progressive local income tax, that raised the average tax rate relatively more on the top income class compared to the income class just below. The bottom panel reports coefficient estimates and 99 percent confidence intervals from municipality-income class clustered standard errors obtained from an event-study research design, which controls for income group and year fixed effects.

income per-capita, is instead relatively smaller.

D.3 Inference

Figure D6 tests the robustness of our findings to different choice of standard error clustering. Panel A refers to the total tax base elasticity; panel B on the extensive margin elasticity; panel C to the intensive margin elasticity. We report the net-of-average elasticity estimates obtained from regressing equation (12) and 95 percent confidence intervals calculated from standard errors clustered at the following level: a. baseline: municipality $\times$ income class, income class $\times$ year, and municipality $\times$ year (our baseline choice); b. only by municipality; c. municipality and income class; d. by year and municipality; e. by income class-local labor market-year.

Figure D6: Robustness to Clustering Choice



Note: This figure reports coefficient estimates and 95 percent confidence intervals obtained from regressions as in equation (12). Panel A refers to the total tax base elasticity; panel B on the extensive margin elasticity; panel C on the intensive margin elasticity. We report estimates with the following different clustering choices: a. baseline: three-way clustering by municipality $\times$ income class, income class $\times$ year, and municipality $\times$ year; b. only by municipality; c. municipality and income class; d. by year and municipality; e. by income class-local labor market-year. Data from tax returns composed of 7,918 municipalities and 7 income classes over the 2001-2015 period.

D.4 Location Pair Analysis from Transfer of Residence Data

Table D3: Local Income Taxation and Transfers of Tax Residence

	Outcome: log of outmigration odds-ratio					
	(1)	(2)	(3)	(4)	(5)	(6)
$log[(1-\tau_{d,t})/(1-\tau_{o,t})]$	6.180***	2.230*	3.226***	3.810***	3.560***	4.295***
	(1.039)	(1.173)	(1.229)	(1.290)	(1.233)	(1.308)
Observations	92,651	92,651	92,651	92,651	92,651	92,651
# of province pairs	10,697	10,697	10,697	10,697	10,697	10,697
Origin-Destination pair FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	No	Yes	Yes	Yes	Yes	Yes
Group trend	No	Yes	Yes	Yes	Yes	Yes
Spending and pr tax controls	No	No	Yes	Yes	Yes	Yes
Origin province x year FE	No	No	No	Yes	No	No
Destination province x year FE	No	No	No	No	Yes	No
Region pair x year FE	No	No	No	No	No	Yes

Note: This table presents the effect of net-of-average tax rate differential on the probability of transferring the tax residence. The outcome variable is the log outmigration odds-ratio: the probability of an individual moving from an origin province to a given destination province relative to the probability of not moving at all. The sample includes 4,549,111 transfers of residence moving within 10,697 province pairs over the 2007-2015 period. Standard errors in parentheses, with three-way clustering by origin-province $\times$ year, destination-province $\times$ year and province-pair.

Table D4: Local Income Taxation and Transfers of Tax Residence - Migration Stock

	Outcome: log of stock of movers					
	(1)	(2)	(3)	(4)	(5)	(6)
$log[(1-\tau_{d,t})/(1-\tau_{o,t})]$	4.052***	2.123**	2.755***	3.224***	3.038***	3.639***
	(0.856)	(0.991)	(1.032)	(1.078)	(1.031)	(1.087)
Observations	92,651	92,651	92,651	92,651	92,651	92,651
# of province pairs	10,697	10,697	10,697	10,697	10,697	10,697
Origin-Destination pair FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	No	Yes	Yes	Yes	Yes	Yes
Group trend	No	Yes	Yes	Yes	Yes	Yes
Spending and pr tax controls	No	No	Yes	Yes	Yes	Yes
Origin province x year FE	No	No	No	Yes	No	No
Destination province x year FE	No	No	No	No	Yes	No
Region pair x year FE	No	No	No	No	No	Yes

Note: This table presents the effect of net-of-average tax rate differential on the probability of transferring the tax residence. The outcome variable is the log of the stock of movers within each location pair. The sample includes 4,549,111 transfers of residence moving within 10,697 province pairs over the 2007-2015 period. Standard errors in parentheses, with three-way clustering by origin-province $\times$ year, destination-province $\times$ year and province-pair.

Table D5: Local Income Taxation and Transfers of Tax Residence - Migration Flows and MTR

	Outcome: log of outmigration odds-ratio					
	(1)	(2)	(3)	(4)	(5)	(6)
$log[(1-\tau_{d,t})/(1-\tau_{o,t})]$	4.508***	1.589*	2.231***	2.676***	2.624***	3.149***
	(0.758)	(0.830)	(0.843)	(0.878)	(0.834)	(0.874)
Observations	92,651	92,651	92,651	92,651	92,651	92,651
# of province pairs	10,697	10,697	10,697	10,697	10,697	10,697
Origin-Destination pair FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	No	Yes	Yes	Yes	Yes	Yes
Group trend	No	Yes	Yes	Yes	Yes	Yes
Spending and pr tax controls	No	No	Yes	Yes	Yes	Yes
Origin province x year FE	No	No	No	Yes	No	No
Destination province x year FE	No	No	No	No	Yes	No
Region pair x year FE	No	No	No	No	No	Yes

Note: This table presents the effect of net-of-marginal tax rate differential on the probability of transferring the tax residence. The outcome variable is the log outmigration odds-ratio: the probability of an individual moving from an origin province to a given destination province relative to the probability of not moving at all. The sample includes 4,549,111 transfers of residence moving within 10,697 province pairs over the 2007-2015 period. Standard errors in parentheses, with three-way clustering by origin-province $\times$ year, destination-province $\times$ year, and province-pair.

Table D6: Local Income Taxation and Transfers of Tax Residence - Migration Stock and MTR

	Outcome: log of stock of movers					
	(1)	(2)	(3)	(4)	(5)	(6)
$log[(1-\tau_{d,t})/(1-\tau_{o,t})]$	3.070***	1.573**	1.959***	2.349***	2.308***	2.771***
	(0.622)	(0.698)	(0.707)	(0.733)	(0.696)	(0.726)
Observations	92,651	92,651	92,651	92,651	92,651	92,651
# of province pairs	10,697	10,697	10,697	10,697	10,697	10,697
Origin-Destination pair FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	No	Yes	Yes	Yes	Yes	Yes
Group trend	No	Yes	Yes	Yes	Yes	Yes
Spending and pr tax controls	No	No	Yes	Yes	Yes	Yes
Origin province x year FE	No	No	No	Yes	No	No
Destination province x year FE	No	No	No	No	Yes	No
Region pair x year FE	No	No	No	No	No	Yes

Note: This table presents the effect of net-of-marginal tax rate differential on the probability of transferring the tax residence. The outcome variable is the log of the stock of movers within each location pair. The sample includes 4,549,111 transfers of residence moving within 10,697 province pairs over the 2007-2015 period. Standard errors in parentheses, with three-way clustering by origin-province × year, destination-province × year and province-pair.

D.5 Transfers of Residence Across Municipality-Bracket Pairs

The location pair analysis across province pairs presented in section 4.1.2 can be subject to measurement errors in the tax rate definition. We tackle this issue by proposing a location pair analysis that relates the outmigration odds-ratio with the net-of-tax rate differential across municipalities *and income bracket pairs*. We perform this analysis using the micro-level tax returns dataset from Veneto, which allows us to observe individual-level changes in the municipality of residence, along with income information. This analysis offers three main advantages compared to the province pair analysis. First, we can leverage more granular variation in location choices (municipality and income bracket pairs instead of province pairs). Second, we can exploit variation in the income tax rate differential along the full income distribution. Third, we can account for unobserved heterogeneity, confounding policy and shocks at a very detailed level.

Similarly to the province pair analysis, we first compute the outmigration odds-ratio relative to each origin municipality-destination municipality-income bracket-year. Then, we relate changes in transfers of tax residence within each of these cells with changes in the net-of-tax rate differential, which we compute as the net-of-average tax rate differential within the municipality and income bracket pair considered.[6] We then run regressions as in equation (13), but controlling for a more granular set of fixed effects. In particular, we can account for origin municipality-destination municipality-income bracket fixed effects, which control not only for unobserved differences in the cost of moving and amenities within each municipality pair, but also allow these differences to arbitrarily vary along the income distribution.

The mobility elasticity estimate would capture mobility responses on location choices *across municipalities within a given region*. When comparing our elasticity estimate from the municipality-bracket pairs analysis with the province pairs analysis, note that the latter accounts for both within and across regions mobility responses, while the former only captures within-region mobility responses. Therefore, if differences in local tax rates significantly affect the geographical allocation of taxpayers both across and within regions, the province pair analysis would yield a larger elasticity estimate than the municipality-bracket pair analysis.

Table D7 reports the mobility elasticity estimates from the location pair analysis across municipality-bracket pairs. We start from a simple model with origin municipality-destination municipality-income bracket fixed effects and year fixed effects. We obtain a precisely estimated elasticity of 0.613 (column 1). We then test the sensitivity of our estimate to adding a plethora of fixed effects, that account for secular trends, policy changes and shocks. First, we account for shocks that equally affect all the taxpayers

[6] In appendix Table D8, we show that the elasticity estimates are remarkably similar when computed using the log of net-of-*marginal* tax rate differential.

in a given origin or destination municipality (columns 2 and 3). The elasticity estimates remain positive and statistically significant, although the magnitude increases when accounting for destination municipality-year fixed effects. Second, we control for shocks affecting all the taxpayers in a given origin or destination municipality and income bracket (columns 4 and 5). The addition of these fixed effects therefore accounts for specific shocks or policies targeting a very narrow group of taxpayers. An elasticity can still be identified by exploiting the variation in the tax rate differential with respect to either the tax rate set by all the potential destination municipalities (column 4) or from the variation in the tax rate set by all the origin municipalities (column 5). We obtain a qualitatively similar elasticity estimate.

Table D7: Tax-induced Transfer of Residence Across Municipality-Bracket Pairs

	(1)	(2)	(3)	(4)	(5)
	Outcome: log of outmigration odds-ratio				
$log[(1-\tau_{d,t})/(1-\tau_{o,t})]$	0.613***	0.552***	1.948***	0.716***	3.201***
	(0.053)	(0.058)	(0.105)	(0.089)	(0.123)
Observations			11,706,159		
# of O mun-D mun-inc bin obs			1,690,710		
O mun × D mun × inc bin FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	No	No	No	No
O mun × year FE	No	Yes	Yes	No	Yes
D mun × year FE	No	No	Yes	Yes	No
O mun × year × inc bin FE	No	No	No	Yes	No
D mun × year × inc bin FE	No	No	No	No	Yes

Note: This table presents the effect of net-of-average tax rate differential on the probability of transferring the tax residence. The outcome variable is the log outmigration odds-ratio: the probability of an individual moving from an origin to a given destination location pair relative to the probability of not moving at all. The sample includes 550,782 transfers of residence moving within 336,399 location pairs over the 2007-2014 period. Standard errors in parentheses are clustered at the origin-municipality × destination-municipality × income bracket level.

Table D8: Tax-induced Transfer of Residence Across Municipality-Bracket Pairs, Marginal Tax Rate

	(1)	(2)	(3)	(4)	(5)
			Outcome: log of outmigration odds-ratio		
$log[(1-\tau_{d,t})/(1-\tau_{o,t})]$	1.020***	0.815***	2.090***	0.553***	3.659***
	(0.049)	(0.053)	(0.081)	(0.076)	(0.090)
Observations			11,706,159		
# of O mun-D mun-inc bin obs			1,690,710		
O mun × D mun × inc bin FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	No	No	No	No
O mun × year FE	No	Yes	Yes	No	Yes
D mun × year FE	No	No	Yes	Yes	No
O mun × year × inc bin FE	No	No	No	Yes	No
D mun × year × inc bin FE	No	No	No	No	Yes

Note: This table presents the effect of net-of-average tax rate differential on the probability of transferring the tax residence. The outcome variable is the log outmigration odds-ratio: the probability of an individual moving from an origin to a given destination location pair relative to the probability of not moving at all. The sample includes 550,782 transfers of residence moving within 336,399 location pairs over the 2007-2014 period. Standard errors in parentheses are clustered at the origin-municipality × destination-municipality × income bracket level.

D.6 Workplace Mobility

Table D9: Workplace Mobility Responses to Taxation

	Outcome: log of outmigration odds-ratio					
	(1)	(2)	(3)	(4)	(5)	(6)
$log[(1-\tau_{d,t})/(1-\tau_{o,t})]$	-1.013	1.368	1.358	1.379	1.585	1.696
	(2.693)	(2.560)	(2.542)	(2.577)	(2.511)	(2.565)
Observations (panel A)	16,134	16,134	16,134	16,134	16,134	16,134
# of province pairs (panel A)	4,275	4,275	4,275	4,275	4,275	4,275
Observations (panel B)	2,537	2,537	2,537	2,537	2,537	2,537
# of teams (city) pairs (panel B)	659	659	659	659	659	659
Orig-dest pair FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	No	Yes	Yes	Yes	Yes	Yes
Group trend	No	Yes	Yes	Yes	Yes	Yes
Sp and pr tax controls	No	No	Yes	Yes	Yes	Yes
Origin province x year FE	No	No	No	Yes	No	No
Destination province x year FE	No	No	No	No	Yes	No
Region pair x year FE	No	No	No	No	No	Yes

Note: This table presents the effect of net-of-average tax rate differential on the probability of changing the province of the workplace. The outcome variable is the outmigration odds-ratio: the probability of an individual moving from an origin location to a given destination location relative to the probability of not moving at all. Standard errors in parentheses, with three-way clustering by origin-location × year, destination-location × year and location-pair.