Taxation, Public Spending and Internal Migratory Responses in Switzerland: Who Votes with Her Feet?

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Abstract

This study investigates mobility reactions to tax rates and public goods in Switzerland. We match administrative data covering the whole population to income data from the social security earnings, and we analyze almost 1,500,000 households' relocations over eight years (2010-2017). We first show that migration profiles are similar across income groups and decrease in age. We then analyze migration responses to the net-of-tax rate and local spending by income groups using an aggregate model of migration flows between municipality pairs. We tackle policy endogeneity bias by including a set of geographical and time fixed effects. Our preliminary results show heterogeneous responses: the tax-base elasticity to net-of-tax rate seems positive and predominantly driven by households without children in the highest quartile of the income distribution. The estimated elasticity is around 3 for the top 10% incomes and stable across specifications. Elasticity estimates to schooling and non-schooling expenditures are unclear and more sensitive to dynamic effects.

Keywords: Migration, Mobility, Taxation, Public Goods
JEL classification: H24, H31, H41, H73, J60, R23

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1 Introduction

The concept that local policies distort location choice is the central idea of Tiebout's seminal paper (1956). Migration responses to tax rates and public policy shape the way households sort across jurisdictions, potentially leading to spatial segregation, but also undermine the ability of governments to redistribute. Understanding forces that govern household location choice is of particular relevance, given existing evidence on the effects of neighborhoods on individuals' long-term outcomes (Chetty and Hendren (2018a); Chetty and Hendren (2018b); Chetty et al. (2016)).

Albeit important, there is still relatively little empirical evidence on mobility induced by local policies (see Kleven et al., 2020 for an overview), in our setting this means tax-rate setting and public budget allocation. First, data requirements for the tax-base elasticity are demanding: accurate measures of applicable tax rates and residential location changes are often available only for selected samples in a population. Second, plausible exogenous variation in local policies is needed, and this requires precise information on local expenditures over the years. Our research tackles these challenges by exploiting rich administrative data covering the full population of residents in Switzerland over eight years to answer the question: "What is the tax base elasticity to changes in tax rate and local public goods provision?".

Our preliminary results indicate heterogeneity in the migratory effect in response to changes in the net-of-tax rate differential between the origin municipality and a destination. The expected count of households relocating is positively correlated with this differential for incomes in the upper quartile, while no relationship exists for the whole population. Instead, migratory responses to local spending differentials are negatively correlated but very small in size. We investigate further underlying explanations for adverse reactions to public expenditures.

Switzerland offers an ideal setting to study tax-base elasticities because local jurisdictions, i.e., *municipalities*, are granted substantial freedom both in terms of revenue

collection and budget allocation. Our strategy relies on the different timing and spatial occurrence of policy changes at the local level by exploiting a panel with information on Swiss households' location over eight years across 2,240 different municipalities. We perform an aggregate analysis of origin-destination municipality pairs by building a mobility matrix with households that moved from an origin to a destination. The pairwise count is then regressed on the average net-of-tax rate, schooling expenditures, and non-schooling expenditures differentials. We exploit their variation over time and across jurisdictions to identify their effect on location choices. The most obvious issue with this identification approach is the non-randomness of local policies. For example, a destination may be very attractive to households if it offers interesting and well-paid jobs and at the same time being a low tax rate jurisdiction. In such a scenario, the location choice could be driven by the jobs offer rather than the appealing tax rates or public services. Our answer for a valid empirical estimation, as the literature suggests, is to control for unobservable factors that might correlate with policy decisions and relocation choices at the same time. The underlying assumption is that, if there is a "permanent" stock of movers in each municipality pair due to unobserved factors, this can be differentiated out to uncover the causal effect of local policies on mobility.

Our paper's contribution is twofold. First, we estimate mobility responses using administrative data on a full working-age native population rather than survey-based and/or selected groups of individuals. Second, we analyze tax-base elasticity to public goods provision, a topic that has been largely ignored so far by the literature. Friedman (1981) was among the first authors demonstrating how local expenditures are relevant factors for the individual location choice. Nechyba (1998) confirmed the results and shed light on the relative importance of per capita spending in education. As noted by Kleven et al. (2020), controlling for non-tax determinants is critical in the interest of a correct estimation of mobility responses to tax rates themselves. In this work, we address this gap by studying the role of public goods provision as a deter-

minant of location choice, in addition to tax rates, for all households in Switzerland. Brülhart et al. (2019) demonstrate that households have different valuations of public goods depending on their income level. Therefore, looking not only into public expenditures, but also on their type (schooling vs non-schooling) is of great relevance to study households reaction functions.

Our paper relates to the growing empirical literature on migratory responses to tax rates. A first subset of studies focuses on international mobility. High-income earners are studied by Kleven et al. (2013b). The authors exploit the introduction of a preferential tax scheme for foreign nationals in Denmark and estimate that their tax-rate elasticity lies between 1.5 and 2. Strong mobility responses are also found among top football players from 14 European countries in Kleven et al. (2013a). The estimated elasticity to the net-of-tax rate is around unity, producing expected sorting effects. Using a similar approach, Akcigit et al. (2016) estimate the international mobility of top quality inventors and show that superstar inventors significantly react to tax rate changes. Foreign superstar inventors' elasticity is around 1, while domestic investors show modest elasticity to net-of-tax rate (0.03). A second body of research focuses on within-country mobility. Agrawal and Foremny (2019) focus on high-income earners in Spain. Using administrative data and exploiting a reform that granted regions the ability to set income tax rate autonomously, the study shows that an increase in the average tax rate for the top 1% of the income distribution reduces the stock of top-income taxpayers, with a 0.92 stock elasticity after accounting for destination, origin and time fixed effects. Moretti and Wilson (2019) estimate star scientists' tax elasticity across the United States. Controlling for state pair and time fixed effects, the authors find that a 1% increase in the net-of-tax rate of the destination state relative to the origin state is associated with a 1.8% increase in the flow of scientists moving from the origin to the destination. In contrast, Young et al. (2014) finds that millionaires are only moderately reactive within the United States: the estimated tax elasticity is 0.1. As for Switzerland, Schmidheiny and Slotwinski (2018) show that mobility responses to local taxes for foreign residents are significant for high-income earners and zero for

low-income earners. The study exploits the introduction of local tax differentials after a permanent residence status is granted. Their regression discontinuity design documents strong responses: foreigners receiving permanent residence are less likely to move away from very high-tax municipalities relative to the control group. **martinez** analyzes mobility responses to a tax cut in the Swiss Canton of Obwalden in 2006[1]. The study relies on aggregate tax data at the municipality level to estimate the reform effect in a difference-in-differences setting. The documented elasticity is noteworthy, between 3.2 and 6.5, essentially driven by small inflows in the canton prior to the reform and canton's small size.

Despite the large body of research, the vast majority of studies focus on a very selected group of individuals, while evidence for a more comprehensive group of individuals is remarkably scant. Our research fills this gap and is most closely related to a past study by Liebig et al. (2007). Using data from the Swiss Census and exploiting differences in tax rates across communities, the authors investigate internal migratory responses to tax rates. A comparison of the year 1995 with 2000 suggests that young and highly educated individuals were the most responsive group to tax rate changes. Our paper differs from this study considerably. First, we directly observe *actual* households' income, while Liebig et al. (2007) had to use predicted earnings. Second, we impute a precise measure of the tax burden by using our tax simulator instead of applying an approximate rate based on income brackets. Third, the panel structure of our data allows to control for unobserved factors and aggregate shocks.[2] Among the few articles considering populations rather than subsamples, Schmidheiny (2006) investigates household location choice in the city of Basel in 1997. A multinomial response framework is applied to study how tax rate differentials across municipalities affect location decisions. The results show that rich households are more likely to move to low tax communities than poor households. A limitation of this study is the use of a single year and the absence of detailed income information[3]. In a recent study, Brülhart et

[1]The reform introduced declining marginal tax rates for income above 300,000 CHF.
[2]Liebig et al. (2007) use the difference between the 1995 and the 2000 cross-sectional datasets.
[3]The study observes only the income before moving.

al., 2019 estimate the stock elasticity of low, middle, and high-income households with and without children, showing that mainly above-median income households without children move in response to local tax rates.

The paper proceeds as follows. In the next section 2 we present the Swiss institutional setting. Next, in 3 we describe the data and present stylized facts of migration in Switzerland. We layout the empirical strategy in 4. Then, in section 5 we present our preliminary results and show their robustness to different specifications in 6.1. In section 7 we discuss the current research stage and the next steps.

2 Institutional setting

Switzerland is a federal country with three tiers of government, and roughly 2,300 municipalities located in 26 cantons. Cantons and municipalities have substantial autonomy in terms of revenue collection and public expenditures. Together, they raise about 53% of the consolidated (federal, cantonal, and municipal) tax revenue. Income tax is the main cantonal and municipal tax instrument, alone it accounts for almost 60% of the total tax revenue[4]. In contrast, corporate tax and wealth represent only a minor share of the fiscal revenue, 16% and 9%, respectively. [5] The federal income tax is regulated by the central government and it is homogeneous across sub-federal levels. Local income taxes are highly heterogeneous instead and are due to the cantonal government, to the municipality, and often also to the church[6]. Cantons enjoy near-complete autonomy over tax-base definition, tax-rate setting, and on how to spend the tax revenue. As a result, in Switzerland, 26 different systems of tax regulations and fund allocations coexist.

[4]Or, roughly 38% of the total revenue

[5]The percentages are calculated over the period 2010-2017, data sourced from the Swiss Federal Finance Administration: http://www.efv.admin.ch/e/dokumentation/finanzstatistik/index.ph.

[6]A church tax is collected in most Swiss cantons, which are autonomous in its regulation.

Income tax is levied annually and according to the primary place of residence. Starting at the age of 18, residents are legally obliged to submit a tax file every year to determine income and (less often) wealth tax burden according to mostly progressive schedules. The taxable income includes all kinds of income, i.e. any remuneration from employment and self-employment, capital income, earnings from the pension scheme, and replacement incomes (e.g unemployment income), net of social contributions, deductions and debt. Married couples return a single tax file (i.e the income tax base is the sum of spouse and partner income) and are subject to a different tax regime than single households[7]. In most cantons, joint taxation applies a splitting factor[8] or using a special tax schedule[9].

Deductions are the main means to reduce the taxable income and thus the tax rate. Typical deductions are granted for children, childcare, double earners, work-related expenses, and retirement savings. They are all capped, and the maximum and minimum amount vary across cantons. Individuals receive a deduction for children in 25 out of 26 canton[10], ranging from a minimum of CHF 750 in the canton of Basel-Landschaft to a maximum of CHF 12,000[11] in the canton of Zug. Few cantons provide social deductions[12]: the amount varies across household types (single, married single with children) and ranges from CHF 3,200 in the canton of Schwyz to CHF 18,000 in the canton of Basel-Stadt[13]. In every canton taxpayers may also benefit from a double-earners deduction if both household members work and are either married or in a registered partnership. The deductions amount varies from CHF 500 in the canton of

[7] In many cantons single households with children are also subject to joint taxation. In our tax calculator, we apply the joint taxation regime to all household heads living with a minor, even if the individual is non legally married.

[8] The income that determines the tax schedule is divided by a factor, commonly 2.

[9] For example, in the canton of Ticino.

[10] Canton VD applies a family quotient.

[11] The amounts refer to the year 2017, data sourced from the Swiss Federal Tax Administration: https://www.estv.admin.ch/estv/fr/home/allgemein/steuerinformationen/fachinformationen/schweizerisches-steuersystem/steuermaeppchen.html.

[12] In the large majority of cantons a social deduction implicitly occurs using different tax schedules.

[13] Single household without children in 2017.

St. Gallen to CHF 9,300 CHF in the canton of Bern[14].

Most municipalities inherit the tax base and the tax schedule from the canton and apply the so-called "tax multiplier" to the cantonal tax burden. Tax multipliers are set every year by the municipal council or the municipal assembly[15]. As a result, tax rates may vary across all 2,240 municipalities. Overall, tax burden variation occurs within each canton because of the local tax multiplier, and across cantons because of differences in cantonal tax systems.

Figure 1 shows the income tax rate across Swiss municipalities in 2017. Using our tax simulator, we calculated the consolidated (cantonal and municipal) tax rate for a hypothetical single household with a yearly gross income of CHF 100,000, with no children and with two children. In our setting, we define the tax rate as an "effective" tax rate, i.e. we divide the amount due as tax burden by the total taxable income. The map shows substantial variation across areas with tax rates varying by a factor of around three. Indeed, a single household with children faces a tax rate of 7.71% ($\sim$ CHF 6,070) in the municipality of Walchwil in the canton of Zug, and of 22% ($\sim$ CHF 18,233) in the municipality of Schelten in the canton of Bern. Some would argue that these two localities are situated 100 km apart from each other and that in closer areas tax rates are more homogeneous. Figure A1 in the appendix shows that even in a short distance there is a considerable number of municipality pairs with a tax rate differentials of at least 4%[16]. Figure 2 reports local total per capita spending in CHF for Swiss municipalities in 2017. The geographical variation is highly interesting, and occurs both across as well as within cantons. We cannot distinguish a clear spatial pattern, except for a tendency to lower per capita expenditures in the central and western parts of the country.

Out of all sample municipalities, 80% of them run an own kindergarten and a primary school. Schooling expenditures account for roughly one third of the average local ex-

[14]The deductible amount may also depend on income.
[15]Municipal assembly is a form of direct democracy and is relatively rare.
[16]The average tax rate differential across pairs is 3.55%

penditures. The financial flows for the schooling system vary by canton: most cantons contribute to the local expenditures through lump sums by pupil or by teacher. Overall, mandatory schooling (we consider here kindergarten and primary school, i.e. up to the age of 11) is financed at 55% by the municipalities, 45% by the cantons[17] The remaining two-thirds of local expenditures are dedicated to other items, like roads and underground infrastructure. While average per capita expenditures for schooling largely varies [18], public school quality is high and fairly homogeneous across the country[19]rivate schools cover only less than 10% of the market for mandatory schooling and are mainly concentrated in urban areas.. Central government co-financing is limited to targeted subsidy programs, e.g. for early childcare and after-schooling activities.

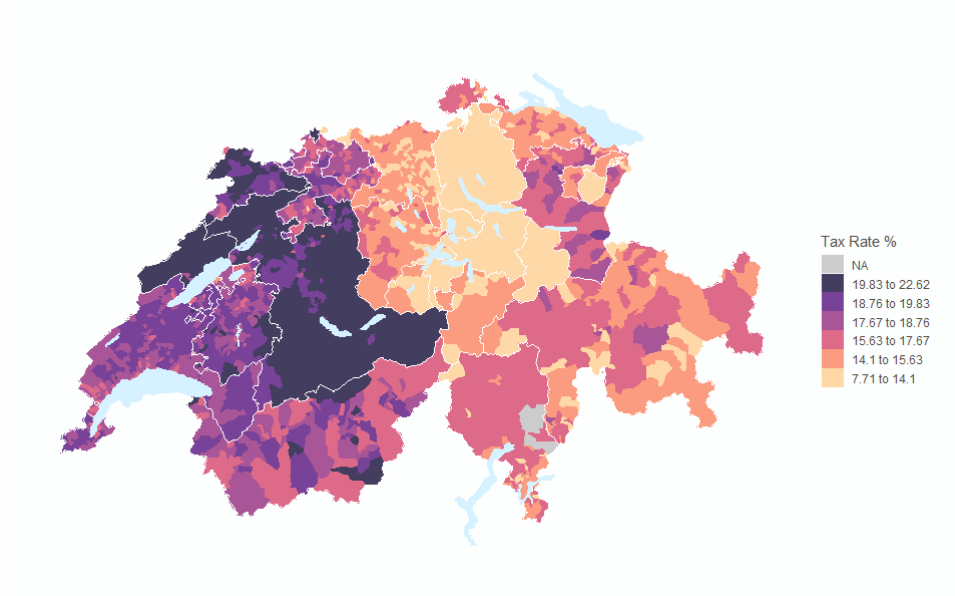
[17]Swiss Federal Office of Statistics, https://www.bfs.admin.ch/bfs/de/home/statistiken/bildung-wissenschaft/bildungsfinanzen/oeffentliche-bildungsausgaben.assetdetail.14367430.html

[18]Minimum of around CHF 11,000 for municipalities in the canton of Bern to more than CHF 30,000 for municipalities in the canton of Zug.

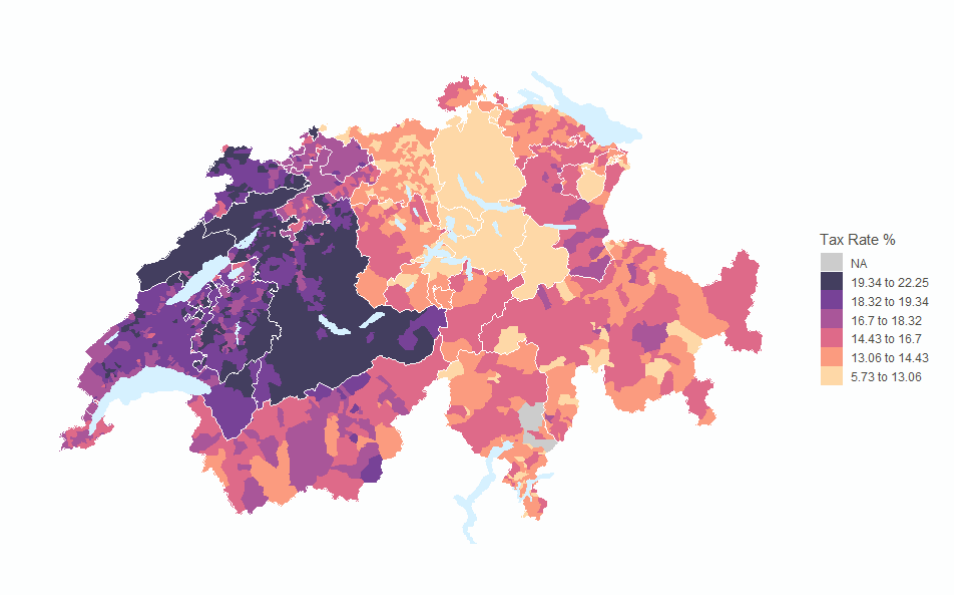
[19]P

Figure 1: Tax rate on CHF 100,000 yearly gross income

(a) Single, no children

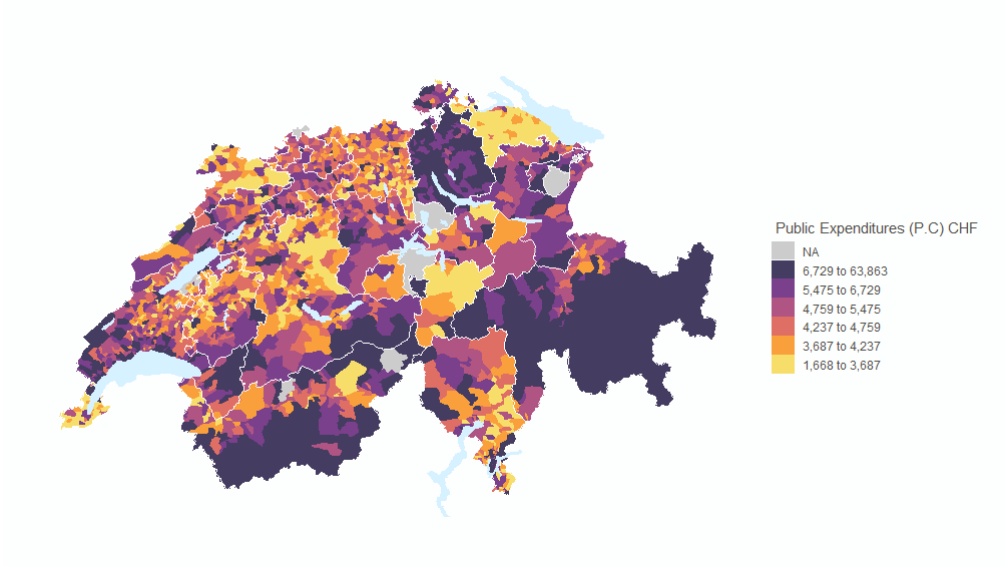


(b) Single, two children



Notes: This figure presents the cantonal and municipal tax rates across Swiss municipalities in 2017. The tax rates are computed for a single taxpayer with a net yearly income of CHF 100,000, it corresponds to the 88th percentile of the labor earnings distribution across all Swiss working population. The tax rate is defined as the tax burden over the taxable income (after deductions) and is calculated using our tax simulator. *Panel (a)* depicts the average tax rate for a single taxpayer without children, while *Panel (b)* shows the average tax rate for a single taxpayer with two children.

Figure 2: Local spending variation



Notes: Figure 2 depicts per capita public spending in 2017 across Swiss municipalities. Amounts are in CHF. Swiss National Science Foundation, Sinergia project n. 147668 "The Swiss Confederation: A Natural Laboratory for Research on Fiscal and Political Decentralization" extended by Laura Fontana-Casellini under the supervision of Prof. Raphaël Parchet (USI).

3 Data and Mobility Patterns in Switzerland

In this section, we describe the data and present stylized facts about migration in Switzerland. This descriptive evidence shows how large is the heterogeneity in the propensity to move based on two main dimensions: age and income, and motivates us to investigate them empirically.

3.1 Data

We draw our data from three sources, the Swiss Federal Statistical Office (FSO), the Central Compensation Office (CCO), and a Swiss National Science Foundation (SNSF)

Sinergia Project[20]. The final dataset combines matched individual-level information, obtained from a merge between the population and households statistics (STATPOP) and the social security earning records (SSER) with administrative municipality-level data from the Sinergia Project.

Matched STATPOP - SSER

Our data originates from the Population and Households Statistics (STATPOP) of the FSO. The data is based on administrative registers and provides us individual-level demographic information on the universe of residents in Switzerland for the years 2010 to 2017[21]. In particular, for every individual we observe, age, gender, marital status, municipality of residence in year t and $t-1$, nationality as well as other information about migration history (e.g., municipality of birth, arrival date in the municipality)[22]. Additionally, we can relate every individual to his family: children, parents, spouse/partner. This important feature helps us to define households accurately. Individual observations are then matched to longitudinal (2010-2017) social security earnings records (CCO). The register covers the universe of labor earnings[23] legally obtained in Switzerland. This includes earnings from employment and self-employment as well as earnings from unemployment and disability benefits. Most important, earnings are not top-coded, therefore we observe the true labor income distribution[24].

In a first step, we define households according to marital status, common children and the municipality of residence. We consider children below 12 years of age because typically, at 11 years a child ends the primary school. Most Swiss municipalities have an own primary school, while the secondary school is, fairly often, in another municipal-

[20]Swiss National Science Foundation, Sinergia project n. 147668 "The Swiss Confederation: A Natural Laboratory for Research on Fiscal and Political Decentralization" extended by Laura Fontana-Casellini under the supervision of Prof. Raphaël Parchet (USI).

[21]The FSO defines as resident all Swiss nationals with the main residence in Switzerland and all foreign nationals that have held a residence or a permanent residence permit for at least 12 months.

[22]All records refers to the end of the year (31st December)

[23]More than 90% of the working-age (18-65 years) population during our sample period 2010-2017

[24]Negative incomes (less than 0.5% of the individual income dataset) and missing records have been imputed as 0

ity. Two individuals are considered a household if they are either married (or equivalently in a registered partnership) or not married, but they have their youngest child in common, and they all live in the same municipality. Unmarried partners without common children and individuals older than 18 years are considered as single households. We then restrict our sample to the individuals with the highest income in the households; we refer to this sample as household heads. Finally, we restrict the sample to Swiss household heads between 18 and 57 years of age because of two reasons. First, only permanent residents are subject to the Swiss tax regime. Foreign nationals are largely subject to different tax regimes, on which our tax simulator would poorly perform. Second, given that we observe only labor income (no pensions) we naturally choose to restrict the individual observations to those within the working age[25]. We will further refer to the observation unit as to a "household" rather than household head. We then rank household's income [26] relative to other households in the same distribution. Figure A3 in the appendix reports the Swiss households labor income distribution. In short, we are able to track over time and space a sample of (i) Swiss households, (ii) between the age of 18 and 57 years, (iii) with non-negative labor incomes.

Migration flows

We define a move at time t when we observe a change in the household's municipality of residence between t and $t-1$. We refer to *origin* and *destination* as the municipality at time $t-1$ and t, respectively. Appendix figure A4 shows the total number of households moves and municipality pairs with positive migration flows over the 2010-2017 period. We observe 1,438,383 (household) moves across 275,567 municipality pairs out of 5,015,360 pairs[27].

[25]Earliest age to be eligible for retirement benefits is 58 years in Switzerland (from so-called Pillar 2).

[26]Note that we call "income" the income of the household's head, while total household income is the mean income of all households members.

[27]2,240$\times$ 2,240-2,240. We harmonize the set of municipalities as of year 2017.

Table 1: Summary Statistics

	Sample						
	All	Top 1%	98-90th	89-75th	74-50th	49-25th	24-0th
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Individual:							
Female (%)	39.35	8.97	14.91	25.87	39.11	55.00	50.77
Age	36.89	48.28	46.27	43.02	37.38	33.61	29.22
Married (%)	28.91	80.50	67.87	50.46	28.00	13.72	5.19
Share Children < 12 (%)	8.78	25.54	20.02	13.68	8.14	5.21	2.56
Nr Children <12 (If any child)	1.45	1.60	1.59	1.57	1.49	1.36	1.31
Youngest Child Age	12.05	12.10	11.77	11.48	11.63	13.58	13.65
Years Municipality	7.58	11.10	10.96	9.36	7.05	6.39	6.07
Household Head Income	69,603	474,447	160,019	100,331	69,872	38,268	7,357
Spouse Income	33,840	53,099	40,033	34,676	30,848	18,530	5,056
Movers (%)	7.57	3.52	4.06	5.95	9.74	10.36	5.42
Movers:							
Intra-Cantonal Movers (%)	69.93	62.41	65.78	68.48	72.97	69.64	70.05
Inter-Cantonal Movers (%)	30.07	37.59	34.22	31.52	27.03	30.36	29.95
Intra-MS Region Movers (%)	43.23	40.03	39.45	41.72	46.21	42.90	43.08
Inter-MS Region Movers (%)	56.77	59.97	60.55	58.28	53.79	57.10	56.92
Distance if Move (km)	31.67	37.78	34.11	31.09	27.45	33.17	34.45
Distance if Move (min)	35.69	39.89	37.24	35.01	32.44	37.11	37.91
Obs.	18,519,125	223,743	1,990,951	3,221,389	5,026,545	3,891,016	4,000,447

Notes: Table 1 provides summary statistics of our sample of households. A household is represented by Swiss household heads between 18 and 57 years old. Income refers to the yearly income of the household head. Instead, total HH Income is the mean yearly income of the household head and his/her partner/spouse. MS Region is a definition of common labor-market regions. There are 106 MS Regions in total in Switzerland.

Table 1 provides summary statistics of our sample of households for the years 2010-2017. Column (1) summarizes the full sample, while columns (2)-(7) show the means by income groups. There is substantial heterogeneity across income groups in terms of household composition. The table clearly shows a positive relationship between income, age, being male and married. In the upper tail of the distribution, household heads are more likely to be men, older and married. The propensity to move (the share of people who moves from a municipality o to a municipality d) is overall quite small.

Interestingly, it is about three times higher for the middle-income groups (second and third quartile) than for the tails. In section 3.2 we investigate migration profiles more in detail. Movers seem to relocate within a radius of about 30 km from the origin municipality, as shown in Figure A2. 80% of the moves occur within a radius of 40 km. Roughly 2/3 of the moves are within the same canton, 2/5 within the same labor market-regions ("MS Region")[28].

Tax Rates

To compute tax rates, we collect information about cantonal tax regimes, and we build our own tax simulator[29]. Specifically, we extended the tax calculator used by Bütler and Ramsden (2017) to our observation period. To impute a precise measure of the taxable income, we assign deductions based on working status and family composition. This includes deductions for i) social purposes, ii) dependent (i.e. children), iii) double-earners, and iv) work-related expenses.[30] Note that we apply the tax rate for married persons to legally unmarried couples who live with a child in common, as this is common practice in most cantons.

For the empirical aggregate analysis we compute a measure of the average tax rate for a representative household in each municipality and income class. Ideally, we want to capture tax rate changes due to changes in the legislation (i.e. tax reforms) rather than structural shifts in the population. To this end, we fix the households population as of 2010 (the first year of our panel) and then calculate the tax rate for different household types (by presence of children and marital status) at the maximum income of their respective income class as of 2010. As a result, we have a representative tax rate for each income class and household type across all panel years and municipalities. At this point we shall stress that we observe income from labor and from transfers, but no income from other sources like pensions or capital. As shown by Martínez

[28] Labor market regions are not identified by institutional borders but by commuting patterns within a common labor market. See section **??**

[29] We collect information from several sources, including the Swiss Federal Tax Administration (ESTV), cantonal laws, cantonal tax offices and "Die Steuern der Schweiz" booklets.

[30] We impute the maximum amount allowed.

(2020), labor income is the most important income source, especially up to the 99th percentile. Overall, income composition follows an inverted U shape, with individuals in the lower tail relying more on transfers while those in the upper tail relying more on capital income. Due to the tax schedule progressivity, we may not accurately capture tax rates for the very top of the income distribution.

Public Expenditure

The largest dataset available to us has been collected by a SNSF Sinergia project. This data provides yearly figures on total municipal spending, including a breakdown by functional categories: public administration, public security, education, culture, healthcare, social security, transportation and communication, environment, economic development, interests, and fiscal equalization. Information on local spending is interesting for our research because it is a proxy for public goods provision, which an often neglected aspect of location choice. Total expenditure figures are available for a set of 21 cantons [31]. A functional breakdown for the full panel 2010-2017 is available for a set of 14 cantons (AG, AR, BE, BL, FR, GR, LU, SG, SO, SZ, TG, VD, VS, ZH.) This peculiarity helps us shed light on whether specific areas of public spending, e.g., education, are stronger household mobility drivers relative to other areas.

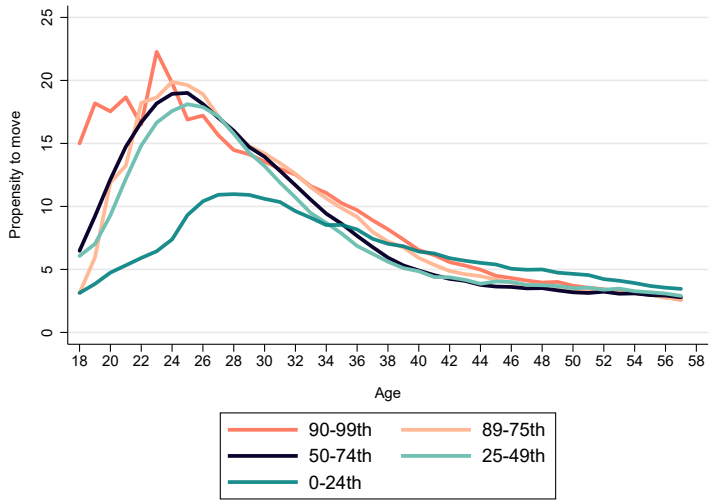
3.2 Who moves and when?

The propensity to move within Switzerland is highly influenced by two factors: age and income. The simple graphical analysis in Figure 3 shows that the decision to move residence is highly correlated with the life cycle, as Schmidheiny (2006) suggests.

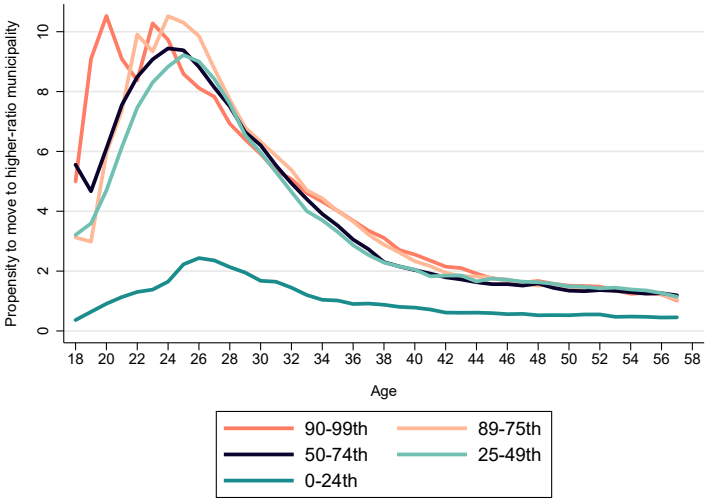
[31] all but AI, BS, NW, JU, ZG

Figure 3: Propensity to move by age and income class

(a) Moving



(b) Moving Up



Notes: This figure show the propensity to move and to move to a location with a better deal by age and income.

Panel (a) in Figure 3 reports the propensity to move depending on age for five different income classes based on the income percentile. Interestingly enough, the bottom income class from the 0 to the 24th percentile has almost a 50% lower propensity to move

than the other three quartiles, with the maximum distance in behavior observed at age 24 to 26. After this turning point, the propensity to move starts declining across all income classes, in particular for the upper three quartiles. From the mid-thirties, the probability of a move is more than halved for the top three income classes compared to the period 24 to 26 years of age and aligned to the propensity of the bottom income class. The propensity to move monotonically decreases over the next two decades until 57 years of age, the maximum of our dataset.

Following the intuition in Giannone et al. (2020) we investigate further how the characteristics of destination municipalities compare to those of the origin municipalities. The central elements of the analysis are the tax burden liability of the household and the level of local public expenditures. These factors are key to the location choice model we describe in Section 4 and answer the question: how much does access to a certain bundle of local public goods cost to a household? To do that, we first compute a ratio of the two measures and look at the propensity to "move-up", i.e., to move to a destination with a higher ratio.[32] Graphically, the results are reported in panel (b) of Figure 3. The first striking fact is that the bottom-income class has a propensity to move-up, close to 0 for most of the observed ages, and never reaches the other income classes' level. Our argument for this is that municipalities with higher ratios also have, on average, higher housing prices in which the ratios are capitalized. The higher housing prices are an obstacle to the bottom income class; therefore, they barely can afford to move-up to those municipalities at all stages in life. Households within the 25th and 99th percentiles experience the peak in realized moving-up around 25 years of age. The propensity to move-up steadily declines with age, similarly to the evolution of the overall propensity to move from panel (b) of Figure 3.

[32] A higher ratio can be attained by either paying a lower tax burden for the same level of local expenditures, or receiving more local public expenditures for the same price, or both.

4 Framework and empirical strategy

In this section, we present a simple model of location choice to guide the empirical analysis.

4.1 Location choice

We start from a simple location choice model following mainly Moretti and Wilson (2017) and Agrawal and Foremny (2019). Links to similar models can be found in Zhang and Hewings (2019), Sasser (2010), and Gabriel et al. (1993).

Let's o denote the origin municipality, and d the municipality of destination. In any period, households choose the location that maximizes their (expected) utility V among a finite set of mutually exclusive destinations. A household i moves from the origin o (residence in $t-1$) to the alternative municipality d (residence in t) if it can attain a higher utility in municipality d than at any other alternative municipality d', origin municipality included (McCorriston (2013)). If the household stays in the same municipality, then the utility at the current municipality of residence outperforms the utility at any other destination d different from the origin o. We define V_{iodt} the utility of a household i moving from o to d in t, V_{ioot} is the utility from not moving:

$$m_{iodt} = \begin{cases} 1 \textit{ if } V_{iodt} > V_{iod't}, \forall d' \neq d \\ 0 \textit{ if } V_{ioot} \geq V_{iodt}, \forall d \neq o \end{cases} \tag{1}$$

We will further refer to "Movers" as to households for which $m_{iodt} = 1$. "Stayers" are households for which $m_{iodt} = 0$, instead.

Households maximize the following utility function V_{iodt}, with functions u and v assumed to be separable and suited for the log functional form:

$$V_{iodt} = u(c_{dt}) + v(s_{dt}) + Z_d - C_{od} + e_{iodt} \tag{2}$$

In the spirit of Agrawal and Foremny (2019), the utility components are the utility from private goods consumption $u(c_{dt})$, from public goods consumption $v(s_{dt})$, utility given by municipal amenities Z_d, and utility from idiosyncratic preferences for the municipality e_{iodt}. We can think of this term as a personal attachment to a location, e.g. the municipality of birth, or it can embed also unobserved personal taste for lake or mountain view, or closeness to specific cultural regions. Total utility is reduced by a factor $-C_{od}$, representing time-invariant moving costs[33]. We can think of this as the distance between the origin and the destination municipality.

Households spend by assumption all their after-tax wage $(1 - \tau_{dt})w_t$ in private consumption goods.[34] We denote with τ_{dt} the municipal tax rate of the destination municipality. We model public goods consumption as a function of the public goods offer, which we proxy with the per capita public expenditures s_{dt}. After substituting the terms, equation 2 reads:

$$V_{iodt} = u((1 - \tau_{dt})w_t) + v(s_{dt}) + Z_d - C_{od} + e_{iodt} \tag{3}$$

Utility is determined by structural factors that are subject to external shocks, like tax rates, wages and public goods provision, but also by idiosyncratic factors, allowing for personal shocks, as a change in family status or composition (children), to influence location choice. Equation 3 specifies $u(\cdot)$ and $v(\cdot)$ as a log-function to interpret estimated parameters as elasticities.

$$\begin{aligned} V_{iodt} &= \ln\left[(1 - \tau_{dt})w_t\right] + \ln s_{dt} + Z_d - C_{od} + e_{iodt} \\ &= \ln\left(1 - \tau_{dt}\right) + \ln w_t + \ln s_{dt} + Z_d - C_{od} + e_{iodt} \end{aligned} \tag{4}$$

At this point we shall stress that our model is a non-standard random utility model.

[33] The cost factor is assumed to be 0 for stayers, i.e. if $d = o$ then $C_{od} = C_{oo} = 0$.

[34] Note that in our model we treat the variable wage w_t as being location-independent, w_t and not w_{dt}. We are interested in relocation choices that are not wage-driven. This is plausibly the case for the relatively close relocations we observe in the data.

Namely, utility is based on a pairwise approach: the utility of the destination municipality is evaluated against the utility of the origin municipality. Hence, the decision to move depends on the origin location at time $t-1$, in line with the literature. A household moving from o to d experiences a loss or gain in utility equal to:

$$\begin{aligned} V_{iodt} - V_{ioot} &= \ln(1-\tau_{dt}) - \ln(1-\tau_{ot}) + \ln s_{dt} - \ln s_{ot} \\ &\quad + (Z_d - Z_o) - (C_{od} - C_{oo}) + (e_{iodt} - e_{ioot}) \\ &= \ln\left[\frac{(1-\tau_{dt})}{(1-\tau_{ot})}\right] + \ln\left(\frac{s_{dt}}{s_{ot}}\right) + (Z_d - Z_o) - C_{od} + (e_{iodt} - e_{ioot}) \end{aligned} \tag{5}$$

Equation 5 indicates that the probability of moving increases, for example, if the tax rate at destination is lower than at the origin, $1-\tau_{dt} > 1-\tau_{ot}$, or if public expenditures are higher at destination than at origin, $s_{dt} > s_{ot}$, all else equal. The utility differential depends negatively on strong preference for the origin municipality in absence of other changes, i.e. if $e_{ioot} > e_{iodt}$.

4.2 Empirical strategy

Our main empirical strategy relies on an aggregate mobility analysis based on the yearly total number of movers within an origin-destination pair. This is particularly useful to benchmark our results against previous studies employing comparable strategies. In section **??** we also sketch the approach for a possible complementary analysis of household-level mobility.

The analysis is run at the origin-destination pair level, with yearly observations. For each pair we compute the total number of moves in a given year:

$$Y_{odt} = \sum_{i=1}^{N} m_{iodt} \tag{6}$$

where N represents the total number of households in the dataset in year t. The count

dependent variable is then regressed on the net-of-tax rate differential and on local public expenditures differential with a Poisson pseudo-likelihood estimation:

$$E(Y_{odt}|z_o, z_d) = exp(\mathbf{Z'}\beta)$$

Where:

$$\mathbf{Z'}\beta = \eta_1 \ln[\frac{(1-\tau_{dt})}{(1-\tau_{ot})}] + \eta_2 \ln\left(\frac{S_{dt}}{S_{ot}}\right) + \eta_3 \ln\left(\frac{NS_{dt}}{NS_{ot}}\right) + \beta\prime\mathbf{X} + \gamma_{od} + \gamma_{MSod\times t} + \lambda_t + \varepsilon_{odt} \quad (7)$$

The left-hand side variable is the count of households that relocate in year t. The net-of-tax rate differential is $\frac{(1-\tau_{dt})}{(1-\tau_{ot})}$, while the differential in local per capita spending is split into schooling (S) vs non-schooling expenditures (NS). We add a vector $\mathbf{X}$ of time-varying municipal-level control variable differentials between destination and origin. The vector includes left-wing and right-wing orientation, share of elderly (inhabitants $\geq$ 65 years of age), share of young people (inhabitants $<$ 15 years of age), and share of foreign population differentials. γ_{od} denotes municipality-pair fixed effects and capture unobserved characteristics specific to the municipality pair that are constant over time, such as mobility costs (say, distance between the origin and destination). Note that γ_{od} also absorbs unobserved features of the origin municipality and of the destination municipality, alone.[35]. To capture labor market shocks we employ a local labor market-regions[36] pair fixed effect $\gamma_{MSod\times t}$. The latter fixed effect is crucial to exclude confounding effects on mobility from adjustment margins other than the local policy changes, e.g., moving in response to a shock to the labor market. To control for nationwide shocks, we include a year fixed effects λ_t. We are interested in the estimation of η_1, η_2 and η_3. The three estimates can be directly interpreted as elasticities of aggregate mobility to net-of-tax rate differentials (η_1), schooling (η_2), and

[35] γ_{od} is equivalent to γ_{od} + γ_o + γ_d in the estimation

[36] The Swiss Federal Office of Statistics classifies Swiss municipalities according to 106 labor market regions ("MS regions"). Labor market regions are not identified by institutional borders but by commuting patterns within a common labor market. Around 30% of the regions cross between 2 and 5 cantonal borders, grouping between 21 and 69 different municipalities.

non-schooling local public expenditures (η_3). We expect a positive coefficient for η_1, in line with the literature. Lacking clear indications from other published work, we remain agnostic about the expected sign of η_2 and η_3.

Previous studies often employ conditional logit approaches following (McFadden, 1977) for the estimation of aggregate location choice models. Following the recent developments of the trade (Silva and Tenreyro (2006)) and labor mobility literature (e.g.Bryan and Morten (2019)) we prefer to estimate the aggregate analysis model with Poisson pseudo-maximum likelihood (PPML). First, the Poisson estimation exploits all available information from the observations, including the municipality pairs without any movers[37], while a logit model would discard these observations. Second, logit models impose the fairly strong axiom of independence of irrelevant alternatives (IIA). According to this axiom, the probability of choosing a particular location is not influenced by unobservable characteristics the model does not control for Guimarães and Woodward (2004). In other words, IIA requires the error term to be independent across alternatives and households. Clearly, the idiosyncratic and unobservable component e allows for correlation among choices (this can be particularly strong for narrowly located destinations) and poorly fits the IIA, with the risk of producing biased estimates. Third, the computational burden of estimating a logit model is large the larger the set of alternatives (Guimarães and Woodward (2003))[38], a feature of our mobility matrix for the aggregate analysis, with 2,240 alternatives (origin municipality included) for each of the 2,240 origin municipalities over eight years.[39]

[37] We remove from the mobility matrices the combinations where origin equals destination because their cell values are by construction 0 and not as a result of a location choice.

[38] In a conditional logit model: $P_{iodt} = \frac{\exp(V_{iodt})}{\sum_m \exp(V_{iodt})}$ where $d = 1, ..., D$. The main source of the computational burden is represented by the computation of the denominator for each household in observation.

[39] In total the mobility matrix has 2,240 (origin municipality) $\times$ 2,240 (destination municipality) $\times$ eight years= 40,140,800 observations, deducing the 2,240 $\times$ 8 where the origin is identical to the destination = 40,122,880 observations.

4.2.1 Identification

In its simplicity, the aggregate analysis is an appealing way to study household responses to local policies and understand the impact, if any, of explicitly controlling for public goods provision. Our concern is to apply a valid identification strategy to uncover *causal effects* rather than correlations between local policies and household mobility. The pairwise approach has the advantage to consider municipal characteristics (and actions) *relative* to other municipalities rather than in isolation. The elasticity estimation can be more precise because we can take into account changes in local policies in all alternative municipalities, thus better fitting tax competition theory. Only in the pairwise approach changes in a municipality's tax base can be related to the exogenous changes in other municipalities' tax rates.

Following the inclusion of municipality-pair (γ_{dot}) and year fixed effects (λ_t) identification comes from variation in local policies that occurred at different points in time. The policy variation can arise from pairs of municipalities that lie within the same labor market region or across two different labor market regions. If the two tax rates or the local public expenditures are equivalent, there is no contribution to the identification as $ln(1) = 0$. If the differential of a given municipality pair is unchanged over time, e.g., because policies never changed, or because both origin and destination municipalities changed policy in the same year but their differential was unaffected, the pair/year observation does not contribute either.

The key threat to identification is that the household's decision to move might be influenced by factors that we do not model explicitly and correlate with local policy changes (omitted variables). No one can deny that Geneva (GE) has a great public infrastructure by the lake to enjoy, whereas Basel (BS) is home to attractive and well-paid jobs in the pharmaceutical industry. Housing properties in St. Moritz (GR) are valued on average three times higher than in Visp (VS), and in Switzerland often moving implies the cost of crossing a linguistic and cultural border. All these more or less observable factors, either specific of the origin, of the destination, or of pair, are taken

into consideration by the term γ_{od}. Moreover, the fixed effect $\gamma_{MSod\times t}$ helps pin down mobility reactions that are independent of labor market shocks, because we capture time-varying confounding factors that might affect all municipalities in the same labor market region. Additionally, economic or demographic changes can hit Switzerland as part of international financial, job and trade markets. Such countrywide shocks that might affect local taxation, public goods provision, and relocation decisions are controlled for by λ_t. Overall, we are able to identify a causal effect to the extent that there are no time-varying confounding effects. Identification is improved compared to previous approaches found in the literature. Section A reports additional tables reporting alternative estimations popular in the literature. One example is the log-linear model applied to municipality pairs as found, among others, in Agrawal and Foremny (2019) with the log count of movers as dependent variable (Table 4). Our identification outperforms the log-linear model because it exploits variation from municipality pairs that changed from 0 to some positive number of movers or the opposite.[40]. A second example is a a municipality-level estimation with fixed effects as exploited in Brülhart et al. (2019) (Table 6). The key advantage compared to the municipality-level estimation is that we can consider changes in tax rates in all alternative municipalities, improving the precision of the elasticity estimation. Our estimation does not outperform the municipality-level in controlling for time-varying potential confounders at municipal level, but it does for pair-invariant confounders.

Our empirical approach minimizes the endogeneity concerns of local policy changes by assuming that migration flows are influenced by permanent and transitory components linked to a location (or location pairs). These components are heterogeneously distributed across locations (or location pairs) and can be factored out with the aggregate analysis.

[40]The log of 0 is unidentified, hence the pair/year observation is discarded from the log-linear model, while it is retained in the Poisson estimation.

5 Preliminary results

In Table 2 we report preliminary estimation results for equation 7 of the aggregate analysis. The estimating equation is run on the full sample and, separately, for each income class[41]. Column (1) reports coefficients for the full sample, columns (2)-(7) report the results for our six income groups. To interpret the results in column (2)-(7), the reader should keep in mind that tax rates and migration flows are group specifics, therefore in column (2)-(7), specific migration flows are regressed on group-specific (log) net-of-tax-rate differentials, and on pair-specific public expenditure differentials. The last two rows show descriptive statistics of the estimation sample. In addition to the number of observations, we report the number of municipality pairs with positive flows as well as the average number of movers across pairs with positive flows. In line with our descriptive evidence in section 3.2, these statistics confirm that relocation patterns are similar across the three upper quartiles of the income distribution.
As we might have expected, overall mobility is not sensitive to net-of-tax rate changes (column (1)). It is somehow reassuring that we do not find any significant effect for the whole population. Indeed, total mobility flows are regressed on an overall average tax rate, which is by construction not representative. Out of 1,351,457 municipality-pair-year observations, 181,813 exhibits positive flows, and among them, we have on average 2.45 households that relocate each year. Despite the similarity on mobility patterns along the income distribution, mobility reactions to tax rates strongly increase in income. We find negative but not significant reactions at the bottom of the distribution, suggesting that below the median income households do not respond to tax rates.

In line with previous studies, we find positive effects at the top of the distribution. An increase in the net-of-tax rate between a given origin and destination increases the number of households moving from the origin to the destination. Intuitively, if a destination becomes more attractive, either because you pay lower tax at the destination

[41]The separate run for each income class is motivated by the excessive computational burden that a unique dataset to run all estimations at once would require.

or because you pay higher taxes at the origin (e.g., net-of-tax rate increases at the destination or decreases at the origin), you expect that more households will move from the origin to the destination. Taxpayers in the top 10% exhibit large mobility elasticities: a 1% increase in the net-of-tax rate differential increase the number of households moving from the origin to the destination by 6.74% and 2.73% for households in the top percentile and in the 90-98th percentile, respectively (columns (2) and (3)). The weighted average of this effect is slightly above 3; rich households (top 10%) have a mobility elasticity of around 3. Column (4) and (5) shows that medium-high income classes are also sensitive to tax rates. The elasticity ranges around 1.8. Compared to previous studies, our mobility elasticity for the top 1% is three to four times higher. However, we argue that this can be explained by differences in the methodological approach and differences in the type of migration analyzed.

Interestingly, coefficients for schooling and non-schooling expenditures are mostly of a negative sign with the notable exception of η_3 for the income classes most sensitive to the net-of-tax rate in columns (3) and (4). An increase in schooling (non-schooling) expenditures differential, either due to an increase in the destination municipality or to a decrease in the origin municipality's schooling expenditures, would decrease the expected count of movers within the pair. Both η_2 and η_3 are very small, all well below 0.2%, but η_2 is quite precisely estimated. To shed light on this first set of results on local expenditures, we will look at the possible existence of dynamic effects in Table 7, and explore additional channels in 5.1.

For the interested reader wondering whether it is the policy changes at destination or at the origin impacting the elasticity estimates, we include an additional table (Table A3) with separated terms for destination and origin municipalities. This approach relaxes any requirement of symmetry between the two possible "identities" of a municipality. Results suggest that incentives to induce migration to the own municipality (as destination) seem stronger than incentives to reduce out-migration from the own municipality (as origin). The most notable exception is the lowest, and least relocation-

prone, income class as we know from the descriptive statistics in section 3.2.

Building on the intuition that heterogeneous households have heterogeneous preferences for public goods (Brülhart et al. (2019)), we further investigate the effect of children's presence in the households by analyzing responses of households with children in primary school age (younger than 12 years old and older than three years old) and without children in primary school age. Because primary school is mostly provided by the municipality of residence, we believe that reactions to school expenditures can be heterogeneous across this two subgroups.

Panel A in Table 3 presents the results for households with children, while panel B shows the results for households without children, as before migration flow and tax rates are group specifics. Overall, the mobility elasticity to net-of-tax rate estimation (η_1) is primarily due to households without children, and this preliminary result is robust to the exclusion of public expenditures, see Table A2. Indeed, panel (B) displays quantitatively similar results as Table 2. Columns (3) and (4) report in Panel A two counterintuitive magnitudes for (η_2) compared to Panel B. We would have expected that households with children dislike public expenditures in schooling less than their counterparts without children, while the estimates suggest the opposite. However, it is worth noting that the sample sizes are substantially different between Panel A and Panel B. Therefore, we argue that results in Panel A have to be interpreted with caution.

Table 2: The effect of Local Policies on Migration by Income Class
Baseline Specification

	(1) All	(2) Top 1%	(3) 98-90th	(4) 89-75th	(5) 74-50th	(6) 49-25th	(7) 24-0th
Fixed Effects: Year, Mun Pair, Destination MS Region by Origin Ms Region							
Δ Net-of-tax rate ($\hat{\eta}_1$)	0.804	7.194**	3.211***	1.836**	1.411**	-0.634	-3.619
	(0.5423)	(2.8861)	(1.0757)	(0.9355)	(0.6578)	(0.6747)	(2.4340)
Δ Schooling Exp ($\hat{\eta}_2$)	-0.0318***	-0.0264	-0.0496*	-0.0597***	-0.0429***	-0.0136	-0.0412**
	(0.0092)	(0.0727)	(0.0286)	(0.0187)	(0.0120)	(0.0135)	(0.0197)
Δ Non-Schooling Exp ($\hat{\eta}_3$)	-0.0128	0.0959	-0.0384	0.0232	-0.0287**	-0.00642	-0.0132
	(0.0092)	(0.0980)	(0.0320)	(0.0201)	(0.0130)	(0.0135)	(0.0200)
Observations	1,406,647	21,357	206,904	412,337	734,557	634,674	356,348
Pairs with movers	48,055	2,045	12,372	20,083	27,631	25,940	48,055
Average movers	2.48	1.15	1.37	1.53	1.85	1.68	1.52

Notes: Each cell in this table reports the coefficient of a Poisson pseudo-likelihood regression of the number of movers from o to d on a measure of (category specific) net-of-tax rate, schooling expenditures and non-schooling expenditures.
All specifications includes Municipality Pairs, Year and MS Region of Destination $\times$ MS Region of origin $\times$ Year Fixed Effects. Standard errors in parentheses, with three-way clustering by origin municipality $\times$ year, destination municipality $\times$ year, and municipality pair. Municipal covariates are: unemployment,left-wing and right-wing orientation, share of people $\geq$ 65y, share of foreign population, share of people $\leq$15y, median wealth tax.
Column (1) include all household heads and use a weighted tax rate. Column (2) -(7) limits the sample to household heads at a given level of the national income distribution and use the average net of tax rate of the specific group.
*$p < 0.10$,**$p < 0.05$, ***$p < 0.01$.

Table 3: The effect of Local Policies on Migration by Income Class and Presence of Children in the Household - Baseline Specification

	(1) Top 1%	(2) 98-90th	(3) 89-75th	(4) 74-50th	(5) 49-25th	(6) 24-0th
Panel A: without children < 12 **y.o**						
Δ Net-of-tax rate ($\hat{\eta}_1$)	4.891	3.025**	2.071**	1.364**	-0.640	-4.413*
	(3.4320)	(1.1808)	(0.9709)	(0.6723)	(0.6841)	(2.6474)
Δ Schooling Exp ($\hat{\eta}_2$)	-0.0344	-0.0513*	-0.0478**	-0.0399***	-0.0102	-0.0369*
	(0.0877)	(0.0304)	(0.0188)	(0.0122)	(0.0134)	(0.0204)
Δ Non-Schooling Exp ($\hat{\eta}_3$)	0.136	-0.0303	0.0230	-0.0283**	-0.00832	-0.00825
	(0.1042)	(0.0343)	(0.0209)	(0.0133)	(0.0138)	(0.0205)
Observations	17,348	187,817	392,334	716,044	615,570	339,495
Pairs with movers	1,766	11,646	19,549	27,349	25,557	48,055
Average movers	1.14	1.36	1.52	1.84	1.67	1.52
Panel B: with children < 12 **y.o**						
Δ Net-of-tax rate ($\hat{\eta}_1$)	10.28	5.609*	-0.726	1.802	-1.227	3.832
	(7.7971)	(3.4004)	(3.1509)	(3.3126)	(4.0667)	(10.3980)
Δ Schooling Exp ($\hat{\eta}_2$)	0.0365	-0.0279	-0.271***	-0.174***	-0.107	-0.159*
	(0.2042)	(0.0768)	(0.0768)	(0.0609)	(0.0745)	(0.0846)
Δ Non-Schooling Exp ($\hat{\eta}_3$)	-0.354	-0.145*	0.0990	-0.0557	0.141*	-0.0398
	(0.2786)	(0.0846)	(0.0778)	(0.0600)	(0.0773)	(0.0904)
Observations	3,655	29,944	39,696	54,282	42,743	26,497
Pairs with movers	489	2,721	3,558	4,811	3,997	2,960
Average movers	1.03	1.05	1.05	1.06	1.05	1.04

Notes: Each cell in this table reports the coefficient of a Poisson pseudo-likelihood regression of the number of movers from o to d on a measure of (category specific) net-of-tax rate, schooling expenditures and non-schooling expenditures for the set of households with children (Panel A) and without children (Panel B) under 12 years of age.
All specifications includes Municipality Pairs, Year and MS Region of Destination $\times$ MS Region of origin $\times$ Year Fixed Effects. Standard errors in parentheses, with three-way clustering by origin municipality $\times$ year, destination municipality $\times$ year, and municipality pair. Municipal covariates are: unemployment, left-wing and right-wing orientation, share of people $\geq$ 65y, share of foreign population, share of people $\leq$15y, median wealth tax.

*$p < 0.10$,**$p < 0.05$, ***$p < 0.01$.

5.1 School spending: a tale of several factors?

Our preliminary results show a fairly unexpected picture for local public school spending. This subsection reports the results of what we have learned from additional investigation on the topic, in an attempt to figure out the mechanisms behind the negative elasticity. First, we shall recognize that the crude measure of public expenditure as we employ in the baseline regression might not perfectly mirror public services as perceived by the population. Ideally, we should exploit a spatially comparable measure of public services representative of households' valutations. The lowest this ideal meaure correlates with *our* measure, the largest the potential bias in the estimates.

Distance between municipalities could represent a second factor that contaminates the relationship between local schooling expenditures and available public services. Spillover effects might arise for closely-located municipalities. At short distances, a household does not need relocation to enjoy a different level or type of schooling service. However, a run of the baseline empirical estimation with the full sample and for different distances between origin and destination municipality does not support this claim, see Table 4.

Third, spending variation - and spending levels - are likely to depend on the population needs. Higher expenditures might reflect higher needs, for example if there is a high share of pupils population that does not speak the local language[42]. Figure 4 suggests that the level of expenditures in a jurisdiction (here, districts) positively correlates with the share of population that speaks a foreign mother tongue, i.e. different than German, French, Italian, or English.

A fourth element that is worth exploring is whether the type of municipality, rural or city, plays a role. The municipality type strongly determines the associated services in the schooling sector, and therefore might confound the mobility estimates we are

[42]Information on the population share that speaks a different language than the local one is available only ad district level. For this reason, we do not include this measure in the baseline estimation, but rather the share of foreign population.

Table 4: Public spending elasticity for municipality pairs at different distances

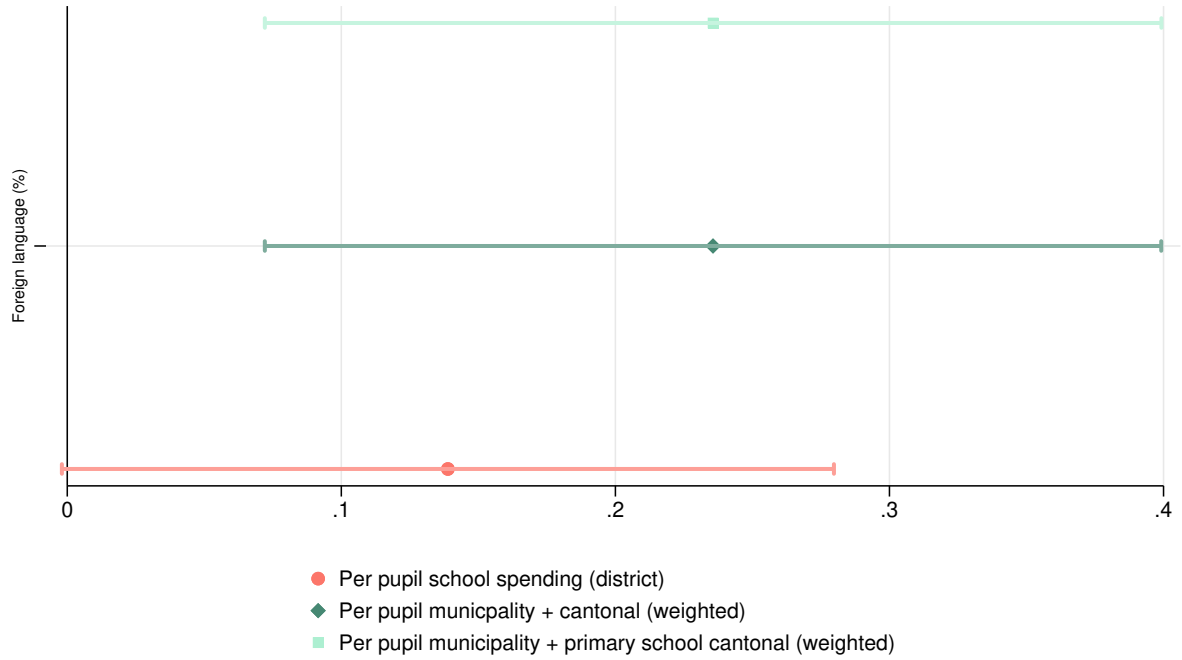
	0-15 km	15-30 km	30-60 km	60 km and more
Δ Net-of-tax rate ($\hat{\eta}_1$)	0.800	1.037	0.836	0.638
	(0.6559)	(0.9292)	(1.1450)	(1.3427)
Δ Schooling Exp ($\hat{\eta}_2$)	-0.0474***	-0.0529***	-0.0242	-0.0461**
	(0.0135)	(0.0186)	(0.0201)	(0.0230)
Δ Non-schooling Exp ($\hat{\eta}_3$)	-0.0172	-0.0344	-0.0234	-0.0310
	(0.0141)	(0.0220)	(0.0259)	(0.0304)
Observations	267,324	341,398	385,130	413,265
Pairs with movers	34,389	44,070	50,504	60,165
Average movers	4.14	2.13	1.55	1.33

Notes: Each cell in this table reports the coefficient of a Poisson pseudo-likelihood regression of the number of movers from o to d on a measure of (category specific) net-of-tax rate, schooling expenditures and non-schooling expenditures for municipality pairs with origin and distance located at a distance between 0 and 15km (endpoint not included), 15 to 30km, 30 to 60km, and 60km and more.
All specifications include Municipality Pairs, Year and MS Region of Destination $\times$ MS Region of origin $\times$ Year Fixed Effects. Standard errors in parentheses, with three-way clustering by origin municipality $\times$ year, destination municipality $\times$ year, and municipality pair. Municipal covariates are: unemployment,left-wing and right-wing orientation, share of people $\geq$ 65y, share of foreign population, share of people $\leq$15y, median wealth tax.
Column (1) include all household heads and use a weighted tax rate. Column (2) -(7) limits the sample to household heads at a given level of the national income distribution and use the average net of tax rate of the specific group.
*$p < 0.10$,**$p < 0.05$, ***$p < 0.01$.

interested in. Table 5. reports a test of the baseline estimation on municipality pairs where at least one municipality is a city, and table 6 where both municipalities are rural[43]. Both results lead us to discard the idea that the effect is contaminated by the municipality type.

[43]We follow here the EUROSTAT classification of "Greater City", https://ec.europa.eu/eurostat/web/cities/spatial-units. In Switzerland, 12 municipalities are classified as cities: Zurich, Winterthur, Bern, Bienne, Thun, Luzern, Zug, Basel, St.Gallen, Lugano, Lausanne and Geneva. For the definition of rural municipalities we follow the classification by the FSO.

Figure 4: Schooling spending and foreign language population share



Notes: This figure presents the correlation between three different measures of expenditures and the share of population with a foreign mother language, i.e. different than German, French, Italian, or English. All variables are at district level. The measure of expenditures are municipal per pupil schooling expenditures, municipal per pupil schooling expenditures and total cantonal (state) expenditures, as well as municipal per pupil schooling expenditures and primary school cantonal expenditures. The last two measures are weighted by the total pupils' population (0-12 years).

Table 5: Elasticity estimates by municipality type - city vs rural

Pair with (at least) a city (GC)	(1) All	(2) Top 1%	(3) 98-90th	(4) 89-75th	(5) 74-50th	(6) 49-25th	(7) 24-0th
Fixed Effects: Year, Mun Pair, Destination MS Region by Origin MS Region							
Δ Net-of-tax rate ($\hat{\eta}_1$)	0.773	5.999	5.535**	3.446	-0.620	-1.325	-1.910
	(1.4063)	(7.4318)	(2.3112)	(2.8291)	(1.8690)	(1.6597)	(5.7767)
Δ Schooling Exp ($\hat{\eta}_2$)	-0.0296	-0.148	-0.0655	-0.117**	-0.0292	-0.0118	-0.0293
	(0.0227)	(0.1470)	(0.0632)	(0.0515)	(0.0334)	(0.0365)	(0.0514)
Δ Non-Schooling Exp ($\hat{\eta}_3$)	-0.0420*	0.281	-0.109	-0.0156	-0.0633*	-0.00144	-0.0472
	(0.0219)	(0.1796)	(0.0810)	(0.0519)	(0.0363)	(0.0403)	(0.0551)
Observations	99,026	3,446	22,591	39,326	56,469	58,939	37,256
Pairs with movers	5,460	495	2,208	3,224	3,856	3,919	5,460
Average movers	5.21	1.34	2.09	2.52	3.30	2.85	2.35

Notes: Each cell in this table reports the coefficient of a Poisson pseudo-likelihood regression of the number of movers from o to d on a measure of (category specific) net-of-tax rate, schooling expenditures and non-schooling expenditures for municipality pairs where either origin or destination, or both, are classified as cities by EUROSTAT.
All specifications include Municipality Pairs, Year and MS Region of Destination $\times$ MS Region of origin $\times$ Year Fixed Effects. Standard errors in parentheses, with three-way clustering by origin municipality $\times$ year, destination municipality $\times$ year, and municipality pair. Municipal covariates are: unemployment,left-wing and right-wing orientation, share of people $\geq$ 65y, share of foreign population, share of people $\leq$15y, median wealth tax.
Column (1) include all household heads and use a weighted tax rate. Column (2) -(7) limits the sample to household heads at a given level of the national income distribution and use the average net of tax rate of the specific group.
*$p < 0.10$,**$p < 0.05$, ***$p < 0.01$.

Table 6: Elasticity estimates by municipality type - city vs rural

pairs rural gde from BFS	(1) All	(2) Top 1%	(3) 98-90th	(4) 89-75th	(5) 74-50th	(6) 49-25th	(7) 24-0th
Fixed Effects: Year, Mun Pair, Destination MS Region by Origin MS Region							
Δ Net-of-tax rate ($\hat{\eta}_1$)	1.685***	7.871	4.601***	4.034***	1.679**	0.242	-0.279
	(0.6204)	(5.9069)	(1.6815)	(1.1569)	(0.7867)	(0.8217)	(3.0911)
Δ Schooling Exp ($\hat{\eta}_2$)	-0.0652***	-0.225	-0.0909	-0.156***	-0.0420**	-0.0491**	-0.0716**
	(0.0131)	(0.2705)	(0.0558)	(0.0322)	(0.0185)	(0.0219)	(0.0320)
Δ Non-Schooling Exp ($\hat{\eta}_3$)	-0.0284*	-0.105	0.0227	0.0130	-0.0615***	-0.0186	-0.0209
	(0.0149)	(0.3336)	(0.0626)	(0.0368)	(0.0223)	(0.0246)	(0.0375)
Observations	886,118	2,896	81,626	210,199	440,448	382,886	202,664
Pairs with movers	28,111	419	4,687	9,217	14,347	13,533	28,111
Average movers	1.74	1.01	1.07	1.17	1.42	1.32	1.21

Notes: Each cell in this table reports the coefficient of a Poisson pseudo-likelihood regression of the number of movers from o to d on a measure of (category specific) net-of-tax rate, schooling expenditures and non-schooling expenditures for municipality pairs where both origin and destination are classified as rural by the FSO.
All specifications include Municipality Pairs, Year and MS Region of Destination $\times$ MS Region of origin $\times$ Year Fixed Effects. Standard errors in parentheses, with three-way clustering by origin municipality $\times$ year, destination municipality $\times$ year, and municipality pair. Municipal covariates are: unemployment,left-wing and right-wing orientation, share of people $\geq$ 65y, share of foreign population, share of people $\leq$15y, median wealth tax.
Column (1) include all household heads and use a weighted tax rate. Column (2) -(7) limits the sample to household heads at a given level of the national income distribution and use the average net of tax rate of the specific group.
*$p < 0.10$,**$p < 0.05$, ***$p < 0.01$.

6 Robustness

Dynamic effects Our estimates could be invalidated if local policies are not exogenous. Indeed, crucial for our purpose is the strict exogeneity of tax rates and public expenditures. A common approach for diagnosing such an issue is to test for pre-trends. In this section, we use a distributed lag model[44] to uncover the timing of the effect and to further test our estimation strategy against possible anticipation effect. Table 7 reports the baseline estimation with the inclusion of two leads and one lag of each of the regressors of interest for all income classes. Results reported in Table 7 does not indicate pre-treatment effects of the net-of-tax rate (coefficients of NTR_{t+1} are not significant). The positive coefficients of local expenditures at $t-1$ suggest that mobility reactions to local expenditures are not immediate. This could be due to a lag between public spending shock and public goods' realization. However, in the long term, our estimates suggest a minor effect for both schooling and non-schooling expenditures.

Somebody might argue that pre-trends are undetected due to limited statistical power Freyaldenhoven et al. (2019), we argue that this is not the case. First, tax multipliers (the main source of variation across municipalities) are usually set at the end of the year for the following year. Therefore, they are likely to be unknown far in advance.

6.1 Sensitivity tests

In this section we test the sensitivity of our results to different specifications. Table 8 and Table 9 confirm that the baseline results presented in Table 2 and Table 3, respectively, are not due to the choice of the fixed effects.

We carry out a second sensitivity check to test the baseline results on mobility elasticity to net-of-tax rate against the inclusion of local expenditures. We run equation 7 excluding η_2 and η_3 and note that the most reactive income classes are again the top quartile

[44] See **schmid19** for equivalence of event studies and distributed lag

(except the top 1% as we have already commented), and the driving subsample is made of households without children (see Panel B of Table A2). This reinforces the intuition that, in the long term, schooling and non-schooling expenditures are likely not consistently driving relocation decisions across most income classes.

Table 7: Dynamics and long term effects

		Top 1%	98-90th	89-75th	74-50th	49-25th	24-0th
		(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Long Term Effect							
Δ Net-of-tax rate ($\hat{\eta}_1$)		8.806**	3.413**	2.540**	1.599**	-1.308	-4.596
		(3.877)	(1.337)	(1.167)	(0.813)	(0.858)	(3.231)
Δ Schooling Exp ($\hat{\beta}_2$)		0.022	-0.031	-0.094***	-0.056***	-0.052***	-0.015
		(0.127)	(0.044)	(0.028)	(0.018)	(0.020)	(0.030)
Δ Non-Schooling Exp ($\hat{\beta}_3$)		0.200	0.066	0.078***	-0.007	0.028	0.018
		(0.134)	(0.045)	(0.030)	(0.019)	(0.019)	(0.031)
Panel B: Distributed Lag							
Δ NTR$_{t+1}$	t+1	2.894	2.070	1.067	0.690	0.0491	-3.591
		(3.881)	(1.398)	(1.064)	(0.796)	(0.901)	(3.699)
Δ Schooling Exp$_{t+1}$	t+1	0.114	-0.0155	-0.0346	-0.0139	-0.0204	0.0264
		(0.091)	(0.036)	(0.023)	(0.016)	(0.017)	(0.026)
Δ Non-Schooling Exp$_{t+1}$	t+1	-0.0102	0.0164	0.0116	0.00741	0.0108	0.00494
		(0.090)	(0.032)	(0.020)	(0.013)	(0.014)	(0.022)
Δ NTR$_t$	t	2.826	1.955	2.425*	0.623	-0.167	-1.805
		(3.973)	(1.491)	(1.285)	(0.974)	(1.060)	(3.852)
Δ Schooling Exp$_t$	t	-0.0389	-0.0617*	-0.0534**	-0.0577***	-0.0165	-0.0580**
		(0.082)	(0.036)	(0.025)	(0.017)	(0.018)	(0.028)
Δ Non-Schooling Exp$_t$	t	0.0589	-0.0812**	-0.00592	-0.0354**	-0.0263	-0.0336
		(0.107)	(0.037)	(0.023)	(0.015)	(0.016)	(0.023)
Δ NTR$_{t-1}$	t-1	3.087	-0.612	-0.952	0.287	-1.190	0.800
		(3.090)	(1.174)	(1.082)	(0.797)	(0.929)	(2.650)
Δ Schooling Exp$_{t-1}$	t-1	-0.0534	0.0460	-0.00627	0.0154	-0.0150	0.0166
		(0.094)	(0.031)	(0.020)	(0.012)	(0.013)	(0.020)
Δ Non-Schooling Exp$_{t-1}$	t-1	0.152	0.131***	0.0719***	0.0207	0.0438***	0.0470**
		(0.104)	(0.031)	(0.021)	(0.013)	(0.014)	(0.022)
Observations		20,545	191,992	378,751	673,120	578,596	324,906

Notes: Each cell in this table reports the coefficient of a Poisson pseudo-likelihood regression of the number of movers from o to d on a measure of (category specific) net-of-tax rate, schooling expenditures and non-schooling expenditures.
All specifications includes Municipality Pairs, Year and MS Region of Destination $\times$ MS Region of origin $\times$ Year Fixed Effects. Standard errors in parentheses, with three-way clustering by origin municipality $\times$ year, destination municipality $\times$ year, and municipality pair. Municipal covariates are: unemployment,left-wing and right-wing orientation, share of people $\geq$ 65y, share of foreign population, share of people $\leq$15y, median wealth tax.

*$p < 0.10$,**$p < 0.05$, ***$p < 0.01$.

Table 8: The effect of Local Policies on Migration: Sensitivity to different specifications

	Top 1%							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Δ Net-of-tax rate ($\hat{\eta}_1$)	3.489*	4.951***	4.234**	6.402***	7.640***	4.579*	4.349	6.301**
	(1.8217)	(1.8725)	(1.9750)	(2.0384)	(2.9405)	(2.7376)	(2.7512)	(2.9797)
Δ Schooling Exp ($\hat{\eta}_2$)	0.0620	0.109	0.0747	0.154	0.0125	0.0541	0.0417	0.302*
	(0.0798)	(0.0889)	(0.0909)	(0.0973)	(0.1071)	(0.0935)	(0.1526)	(0.1702)
Δ Non-Schooling Exp ($\hat{\eta}_3$)	-0.0639	-0.0834	-0.0581	-0.118	-0.0250	-0.0563	-0.214	-0.0240
	(0.0735)	(0.0901)	(0.0902)	(0.0923)	(0.1069)	(0.0919)	(0.1593)	(0.1568)
Origin, Destination FE	Yes	No	No	No	No	No	No	No
Mun Pair FE	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Origin MS region $\times$ Year FE	No	No	Yes	No	No	No	No	No
Destination MS region $\times$ Year FE	No	No	No	Yes	No	No	No	No
MS Region Pair $\times$ Year FE	No	No	No	No	Yes	No	No	No
Canton Pair $\times$ Year FE	No	No	No	No	No	Yes	No	No
Origin Mun $\times$ Year FE	No	No	No	No	No	No	Yes	No
Destination Mun $\times$ Year FE	No	No	No	No	No	No	No	Yes
Obs.	5,962,243	27,995	27,462	27,589	18,530	26,471	17,993	17,804

Notes: Each cell in this table reports the coefficient of Poisson pseudo-likelihood regression of the number of movers from o to d on a measure of (category specific) net-of-tax rate.
Standard errors in parentheses, with three-way clustering by origin municipality $\times$ year, destination municipality $\times$ year, and municipality pair. Municipal covariates are: unemployment, left-wing and right-wing orientation, share of people $\geq$ 65y, share of foreign population, share of people $\leq$15y, median wealth tax.

*$p < 0.10$,**$p < 0.05$, ***$p < 0.01$.

Table 9: The effect of Local Policies on Migration: Sensitivity to different specifications

	98-90th							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Δ Net-of-tax rate ($\hat{\eta}_1$)	1.233	1.705**	1.701*	1.803**	2.704**	2.300**	2.492**	0.167
	(1.6137)	(0.8322)	(0.8805)	(0.8606)	(1.1023)	(1.0480)	(1.1263)	(1.1146)
Δ Schooling Exp ($\hat{\eta}_2$)	-0.0827*	-0.110***	-0.116***	-0.0897***	-0.0770**	-0.0939***	-0.176***	-0.0784**
	(0.0438)	(0.0272)	(0.0269)	(0.0263)	(0.0322)	(0.0308)	(0.0369)	(0.0394)
Δ Non-Schooling Exp ($\hat{\eta}_3$)	0.0213	0.0191	0.00933	0.0107	0.00923	0.00547	-0.0185	0.0457
	(0.0383)	(0.0383)	(0.0386)	(0.0391)	(0.0414)	(0.0385)	(0.0515)	(0.0606)
Origin, Destination FE	Yes	No	No	No	No	No	No	No
Mun Pair FE	No	Yes	Yes	Yes	Yes	Yes	No	No
Origin MS region $\times$ Year FE	No	No	Yes	No	No	No	No	No
Destination MS region $\times$ Year FE	No	No	No	Yes	No	No	No	No
MS Region Pair $\times$ Year FE	No	No	No	No	Yes	No	No	No
Canton Pair $\times$ Year FE	No	No	No	No	No	Yes	No	No
Origin Mun $\times$ Year FE	No	No	No	No	No	No	Yes	No
Destination Mun $\times$ Year FE	No	No	No	No	No	No	No	Yes
Obs.	21,359,209	222,986	222,789	222,871	194,220	221,792	205,537	206,434

Notes: Each cell in this table reports the coefficient of Poisson pseudo-likelihood regression of the number of movers from o to d on a measure of (category specific) net-of-tax rate.
Standard errors in parentheses, with three-way clustering by origin municipality $\times$ year, destination municipality $\times$ year, and municipality pair. Municipal covariates are: unemployment, left-wing and right-wing orientation, share of people $\geq$ 65y, share of foreign population, share of people $\leq$15y, median wealth tax.

*$p < 0.10$,**$p < 0.05$, ***$p < 0.01$.

7 Conclusion

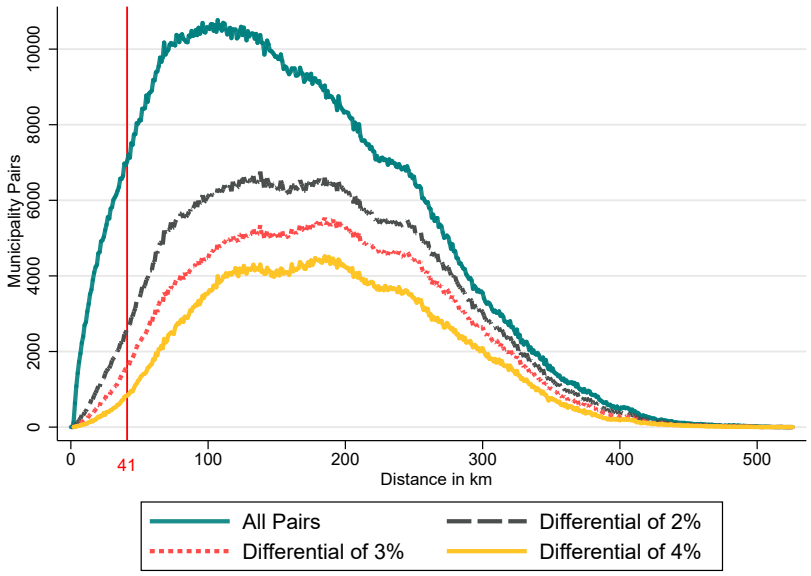
This work analyzes mobility reactions to local policies in Switzerland. Using data on around 1,500,000 moves, we quantify mobility elasticities to local taxes and local expenditures. Our strategy relies on a flow model of migration: mobility flows at the municipality pair level are regressed on net-of-tax rate and net-of-local expenditures differentials, and we control for constant flows across pair and time and regional pair time trends. Additionally, we include a set of municipality-level controls to control for local shocks at pair level. We assume that absent tax and public expenditures changes, region pair mobility flows are fixed over time. We confirm results from previous literature; indeed, we find that wealthy taxpayers are highly sensitive to tax rates, with an estimated elasticity of 6.7. Furthermore, we also find substantial responses for the first quartile of the distribution. We find negative responses to schooling expenditure predominant to households without children in school age. A potential explanation is that expenditures shocks do not immediately translate into public goods shock. We also outline an empirical strategy for an individual analysis to make the most out of the information our data provides. Therefore, our next research targets are related to refining this alternative strategy to compare the results with the aggregate analysis. With this strategy, we aim at providing novel results on tax-base elasticities to local policies.

Although the top 1% of taxpayers is the most reactive group, we provide evidence that tax-induced migration is not exclusive to wealthy taxpayers. Implications for the revenue collection are not yet investigated.

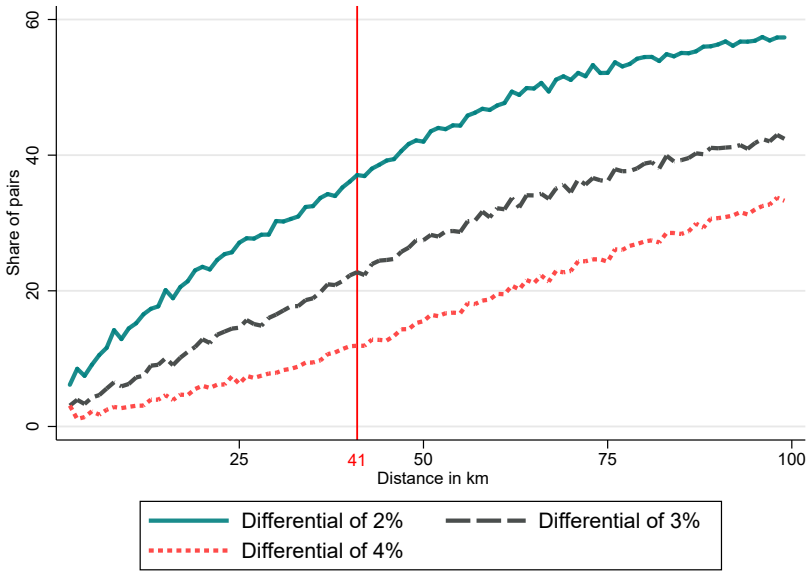
Appendix

Figure A1: Tax rate variation and distance

(a) Pairs of municipalites



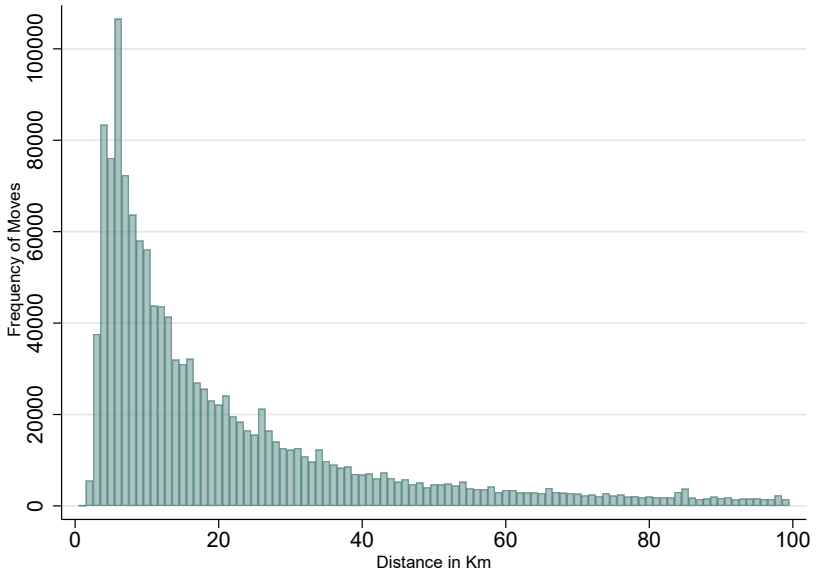
(b) Share of municipality pairs



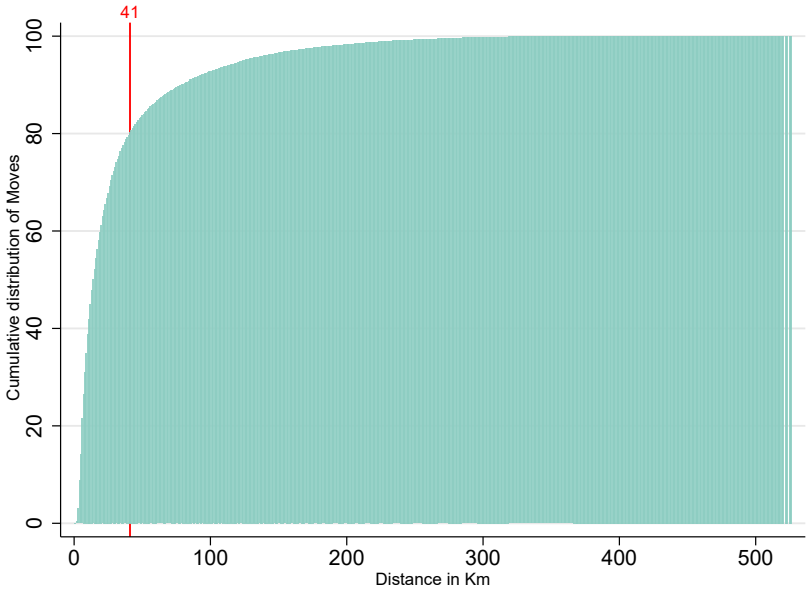
Notes: The total number of pairs is 2240×2240-2240.

Figure A2: Movements and distance

(a) Distribution of Moves across distance

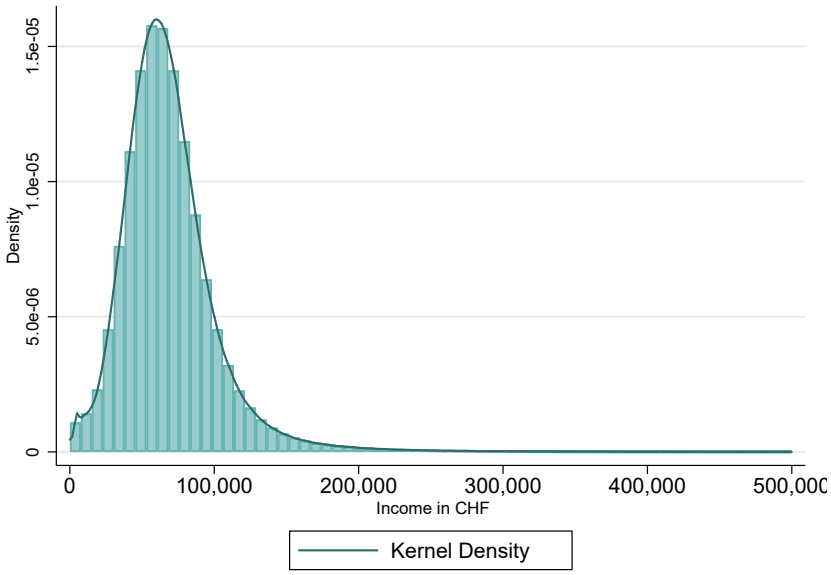


(b) Cumulative moves across distance



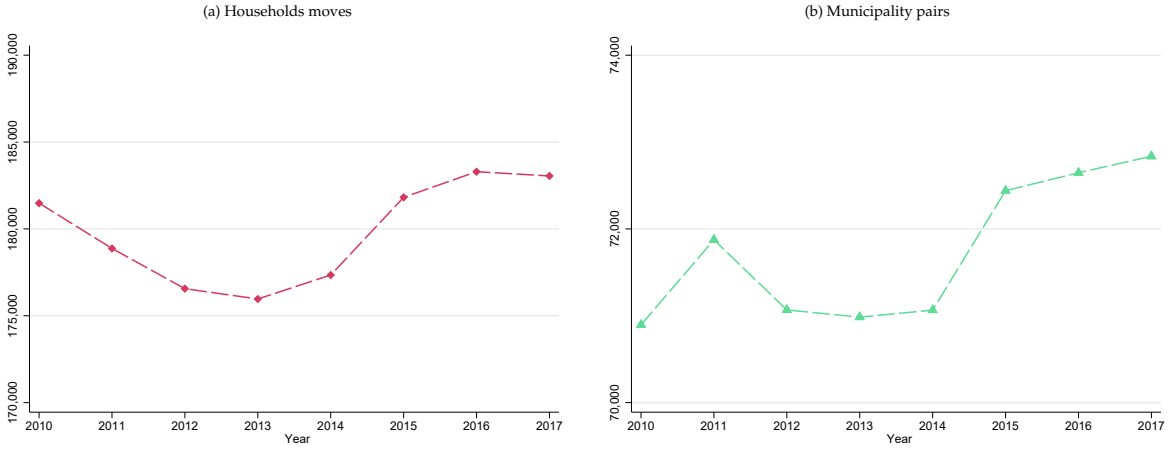
Notes: The figure presents the distribution of moves across distance over our period of observation.

Figure A3: Labor earnings distribution



Notes: Figure A3 presents the labor earnings distribution among Swiss households heads in the working age group (18-57 years old). Individual observations are averaged over the years 2010-2017. Missing records have been replaced with 0.

Figure A4: Migration flows over time



Notes: Figure A4 presents migration flows over time. Panel (a) shows the number of household moves over time and panel (b) depicts the total number of pairs with positive flows. Total number of households moves is 1,438,383 and the total number of pairs with non-zero flows is 275,567 (out of 5,015,360).

Table A1: The effect of Local Policies on Migration by Income Class and Parenting Status

	(1) All	(2) Top 1%	(3) 98-90th	(4) 89-75th	(5) 74-50th	(6) 49-25th	(7) 24-0th
Fixed Effects: Year, Mun Pair, Destinaiton MS Region by Origin Ms Region by Year							
Δ Net-of-tax rate ($\hat{\eta}_1$)	0.770	7.165**	3.065***	1.959**	1.324**	-0.652	-3.376
	(0.5412)	(2.8783)	(1.0727)	(0.9306)	(0.6575)	(0.6710)	(2.4295)
Observations	1,406,647	21,357	206,904	412,337	734,557	634,674	356,348
Pairs with movers	48,055	2,045	12,372	20,083	27,631	25,940	48,055
Average movers	2.48	1.15	1.37	1.53	1.85	1.68	1.52

Notes: Each cell in this table reports the coefficient of a Poisson pseudo-likelihood regression of the number of movers from o to d on a measure of (category specific) net-of-tax rate.
All specifications includes Municipality Pairs, Year and MS Region of Destination $\times$ MS Region of origin $\times$ Year Fixed Effects. Standard errors in parentheses, with three-way clustering by origin municipality $\times$ year, destination municipality $\times$ year, and municipality pair. Municipal covariates are: unemployment, left-wing and right-wing orientation, share of people $\geq$ 65y, share of foreign population, share of people $\leq$15y, median wealth tax.

*$p < 0.10$,**$p < 0.05$, ***$p < 0.01$.

Table A2: The effect of Local Policies on Migration by Income Class and Parenting Status

	(1) Top 1%	(2) 98-90th	(3) 89-75th	(4) 74-50th	(5) 49-25th	(6) 24-0th
Panel A: with children						
Δ Net-of-tax rate ($\hat{\eta}_1$)	10.49	5.145	0.240	1.540	-0.423	3.438
	(7.7811)	(3.3855)	(3.0865)	(3.3024)	(4.0550)	(10.3050)
Observations	3,655	29,944	39,696	54,282	42,743	26,497
Pairs with movers	489	2,721	3,558	4,811	3,997	2,960
Average movers	1.03	1.05	1.05	1.06	1.05	1.04
Panel B: without children						
Δ Net-of-tax rate ($\hat{\eta}_1$)	4.813	2.894**	2.187**	1.278*	-0.659	-4.076
	(3.4133)	(1.1764)	(0.9651)	(0.6721)	(0.6806)	(2.6405)
Observations	17,348	187,817	392,334	716,044	615,570	339,495
Pairs with movers	1,766	11,646	19,549	27,349	25,557	48,055
Average movers	1.14	1.36	1.52	1.84	1.67	1.52

Notes: Each cell in this table reports the coefficient of Poisson pseudo-likelihood regression of the number of movers from o to d on a measure of (category specific) net-of-tax rate.
All specifications includes Municipality Pairs, Year and MS Region of Destination $\times$ MS Region of origin $\times$ Year Fixed Effects. Standard errors in parentheses, with three-way clustering by origin municipality $\times$ year, destination municipality $\times$ year, and municipality pair. Municipal covariates are: unemployment, left-wing and right-wing orientation, share of people $\geq$ 65y, share of foreign population, share of people $\leq$15y, median wealth tax.

*$p < 0.10$,**$p < 0.05$, ***$p < 0.01$.

A Additional tables

Table A3: Destination vs origin

	(1) All	(2) Top 1%	(3) 98-90th	(4) 89-75th	(5) 74-50th	(6) 49-25th	(7) 24-0th
Δ Net-of-tax rate destination	1.648*	8.140*	6.000***	3.510**	2.181**	-1.324	1.380
	(0.9189)	(4.8615)	(1.6909)	(1.5062)	(1.1007)	(1.0854)	(3.8882)
Δ Net-of-tax rate origin	0.533	-0.914	0.417	1.528	-0.858	0.223	-12.78***
	(0.7323)	(5.2627)	(1.6281)	(1.3584)	(0.9573)	(0.9024)	(4.1872)
Δ Schooling Exp destination	-0.111***	-0.248	-0.303***	-0.206***	-0.112***	-0.0486*	-0.114***
	(0.0222)	(0.1647)	(0.0562)	(0.0420)	(0.0290)	(0.0255)	(0.0372)
Δ Schooling Exp origin	0.00403	-0.303	0.0341	0.0172	0.00330	-0.00421	0.0357
	(0.0150)	(0.2208)	(0.0580)	(0.0355)	(0.0198)	(0.0243)	(0.0377)
Δ Non-Schooling Exp destination	-0.0326	-0.131	-0.0184	0.0356	-0.0503*	-0.0200	-0.0797*
	(0.0212)	(0.1737)	(0.0634)	(0.0419)	(0.0300)	(0.0290)	(0.0414)
Δ Non-Schooling Exp origin	-0.00241	-0.146	0.0112	-0.0256	-0.0320	0.0236	0.0262
	(0.0151)	(0.2050)	(0.0588)	(0.0383)	(0.0228)	(0.0262)	(0.0385)
Observations	1,092,708	14,352	152,415	313,751	570,447	490,979	286,986
Pairs with movers	167,543	2,643	24,491	49,164	88,421	77,061	46,064
Average movers	2.41	1.14	1.35	1.50	1.81	1.65	1.51

Notes: Each cell in this table reports the coefficient of Poisson pseudo-likelihood regression of the number of movers from o to d on a measure of (category specific) net-of-tax rate, schooling expenditures and non-schooling expenditures as in the baseline estimation but separating the terms for destination and origin municipality. We regress $\mathbf{Z}'\beta = \phi_1 \ln(1-\tau_{dt}) + \phi_2 \ln(1-\tau_{ot}) + \phi_3 \ln(S_{dt}) + \phi_4 \ln(S_{ot}) + \phi_5 \ln(NS_{dt}) + \phi_6 \ln(NS_{ot}) + \beta\prime\mathbf{X} + \gamma_{od} + \gamma_{MSod\times t} + \lambda_t + \varepsilon_{odt}$
All specifications includes Municipality Pairs, Year and MS Region of Destination $\times$ MS Region of origin $\times$ Year Fixed Effects. Standard errors in parentheses, with three-way clustering by origin municipality $\times$ year, destination municipality $\times$ year, and municipality pair. Municipal covariates, entering the equation separately for origin and destination (not in differential), are: unemployment,left-wing and right-wing orientation, share of people $\geq$ 65y, share of foreign population, share of people $\leq$15y, median wealth tax. Column (1) includes all households and uses a weighted tax rate. Columns (2) -(7) limit the sample to households at a given level of the national income distribution and use the average net of tax rate of the specific group. *$p < 0.10$,**$p < 0.05$, ***$p < 0.01$.

Table 4: Log-count

	(1) All	(2) Top 1%	(3) 98-90th	(4) 89-75th	(5) 74-50th	(6) 49-25th	(7) 24-0th
Δ Net-of-tax rate ($\hat{\eta}_1$)	0.805**	4.431	0.325	-0.202	1.012**	-0.349	1.661
	(0.3681)	(3.3108)	(0.8112)	(0.6098)	(0.4442)	(0.4857)	(2.1136)
Δ Schooling Exp ($\hat{\eta}_2$)	-0.00740	0.150	-0.0339	-0.0212	-0.00727	-0.00802	0.00350
	(0.0087)	(0.1037)	(0.0261)	(0.0178)	(0.0107)	(0.0113)	(0.0161)
Δ Non-Schooling Exp ($\hat{\eta}_3$)	-0.00409	0.0140	0.00862	-0.0160	-0.0186	-0.00659	-0.0147
	(0.0084)	(0.0800)	(0.0314)	(0.0170)	(0.0115)	(0.0126)	(0.0200)
Observations	259,823	1,168	19,236	50,635	120,814	90,154	41,501
Pairs with movers	68,984	370	6,051	15,130	33,621	25,894	12,661
Average log movers	0.42	0.077	0.16	0.21	0.31	0.26	0.21

Notes: Each cell in this table reports the coefficient of a linear regression of the log number of movers from o to d on a measure of (category specific) net-of-tax rate, schooling expenditures and non-schooling expenditures. All specifications includes Municipality Pairs, Year and MS Region of Destination $\times$ MS Region of origin $\times$ Year Fixed Effects. Standard errors in parentheses, with three-way clustering by origin municipality $\times$ year, destination municipality $\times$ year, and municipality pair. Municipal covariates are: unemployment, left-wing and right-wing orientation, share of people $\geq$ 65y, share of foreign population, share of people $\leq$15y, median wealth tax. *$p < 0.10$,**$p < 0.05$, ***$p < 0.01$.

Table 5: Log-count

	(1) Top 1%	(2) 98-90th	(3) 89-75th	(4) 74-50th	(5) 49-25th	(6) 24-0th
Panel A: with children < 12 y.o						
Δ Net-of-tax rate ($\hat{\eta}_1$)	17.69	2.682	3.611	-4.547	-1.288	-0.312
	(12.4605)	(4.2948)	(3.0817)	(2.8272)	(4.0909)	(5.1643)
Δ Schooling Exp ($\hat{\eta}_2$)	0.601	0.136	-0.0857	0.133**	-0.0545	0.0239
	(0.7646)	(0.1676)	(0.0936)	(0.0673)	(0.0762)	(0.1789)
Δ Non-Schooling Exp ($\hat{\eta}_3$)	-0.740*	0.0397	-0.108	0.116	-0.0198	0.112
	(0.4027)	(0.1072)	(0.1290)	(0.0783)	(0.0963)	(0.1660)
Observations	72	855	1,156	2,137	1,189	594
Pairs with movers	29	347	468	850	474	241
Average log movers	0.018	0.032	0.029	0.039	0.028	0.026
Panel B: without children < 12 y.o						
Δ Net-of-tax rate ($\hat{\eta}_1$)	6.300	1.120	0.186	1.096**	-0.199	1.650
	(4.7444)	(0.8956)	(0.6293)	(0.4540)	(0.4811)	(2.2670)
Δ Schooling Exp ($\hat{\eta}_2$)	0.118	-0.0341	-0.0195	-0.00302	-0.00271	-0.0000167
	(0.1349)	(0.0290)	(0.0189)	(0.0109)	(0.0116)	(0.0177)
Δ Non-Schooling Exp ($\hat{\eta}_3$)	0.0480	0.0354	-0.0217	-0.0183	-0.00867	-0.0205
	(0.0900)	(0.0343)	(0.0177)	(0.0117)	(0.0128)	(0.0208)
Observations	929	16,932	47,655	117,243	87,110	39,219
Pairs with movers	298	5,331	14,283	32,675	25,058	11,987
Average log movers	0.071	0.15	0.21	0.31	0.26	0.21

Notes: Each cell in this table reports the coefficient of a linear regression of the log number of movers from o to d on a measure of (category specific) net-of-tax rate, schooling expenditures and non-schooling expenditures for the set of households with children (Panel A) and without children (Panel B) under 12 years of age. All specifications includes Municipality Pairs, Year and MS Region of Destination $\times$ MS Region of origin $\times$ Year Fixed Effects. Standard errors in parentheses, with three-way clustering by origin municipality $\times$ year, destination municipality $\times$ year, and municipality pair. Municipal covariates are: unemployment, left-wing and right-wing orientation, share of people $\geq$ 65y, share of foreign population, share of people $\leq$15y, median wealth tax. *$p < 0.10$,**$p < 0.05$, ***$p < 0.01$.

Table 6: Municipality-level

	(1) All	(2) Top 1%	(3) 98-90th	(4) 89-75th	(5) 74-50th	(6) 49-25th	(7) 24-0th
Net-of-tax rate ($\hat{\eta}_1$)	0.373	1.372	0.810*	1.456***	0.725*	-0.432	-2.168
	(0.2901)	(0.8768)	(0.4909)	(0.4934)	(0.4312)	(0.4975)	(1.4210)
Schooling Exp ($\hat{\eta}_2$)	-0.00214	-0.000711	0.0112	0.0153	-0.0241*	-0.00659	-0.0104
	(0.0056)	(0.0321)	(0.0195)	(0.0135)	(0.0140)	(0.0117)	(0.0140)
Non-Schooling Exp ($\hat{\eta}_3$)	-0.0220***	-0.0509	-0.0338**	-0.0310**	-0.0328***	-0.0285*	-0.00563
	(0.0055)	(0.0336)	(0.0152)	(0.0153)	(0.0116)	(0.0155)	(0.0185)
Observations	13,819	11,042	13,738	13,808	13,816	13,819	13,809
Average log count of taxpayers	6.13	2.09	3.83	4.40	4.84	4.60	4.53

Notes: Each cell in this table reports the coefficient of a regression of the log count of households on a measure of (category specific) net-of-tax rate, schooling expenditures and non-schooling expenditures. We regress $\ln TP_{it} = \beta_1 \ln(1-\tau_{it}) + \beta_2 \ln S_{it} + \beta_3 \ln NS_{it} + \beta\prime\mathbf{X} + \alpha_i + \gamma_{MSod\times t} + \lambda_t + \varepsilon_{it}$
where TP_{it} is the number of households in municipality i at time t. All specifications include Municipality, Year and MS Region Fixed Effects. Standard errors in parentheses, with one-way clustering by municipality. Municipal covariates are: unemployment,left-wing and right-wing orientation, share of people $\geq$ 65y, share of foreign population, share of people $\leq$15y, median wealth tax. Column (1) includes all households and uses a weighted tax rate. Columns (2) -(7) limit the sample to households at a given level of the national income distribution and use the average net of tax rate of the specific group. *$p < 0.10$,**$p < 0.05$, ***$p < 0.01$.

Table 7: Municipality-level

	(1) Top 1%	(2) 98-90th	(3) 89-75th	(4) 74-50th	(5) 49-25th	(6) 24-0th
Panel A: with children < 12 y.o						
Net-of-tax rate ($\hat{\eta}_1$)	-1.130	1.381	1.048*	-0.507	1.788	5.363
	(1.1188)	(0.8630)	(0.6343)	(0.9157)	(1.8375)	(4.6220)
Schooling Exp ($\hat{\eta}_2$)	0.0249	0.0218	-0.000398	-0.0187	0.0620*	0.000647
	(0.0426)	(0.0262)	(0.0233)	(0.0219)	(0.0335)	(0.0376)
Non-Schooling Exp ($\hat{\eta}_3$)	-0.0123	-0.0428*	-0.0389	-0.0326	0.00903	-0.0197
	(0.0455)	(0.0256)	(0.0250)	(0.0237)	(0.0342)	(0.0465)
Observations	7,739	13,306	13,661	13,687	13,157	10,957
Average log count of taxpayers	1.16	2.67	3.04	2.95	2.08	1.36
Panel B: without children < 12 y.o						
Net-of-tax rate ($\hat{\eta}_1$)	1.431	0.0479	0.775	1.056**	-0.656	-1.397
	(1.0026)	(0.6118)	(0.6082)	(0.5351)	(0.4991)	(1.5053)
Schooling Exp ($\hat{\eta}_2$)	0.00256	0.0123	0.0256	-0.0174	-0.0136	-0.0111
	(0.0358)	(0.0220)	(0.0177)	(0.0142)	(0.0128)	(0.0144)
Non-Schooling Exp ($\hat{\eta}_3$)	-0.0180	-0.0280	-0.0209	-0.0274**	-0.0300*	-0.00703
	(0.0385)	(0.0185)	(0.0175)	(0.0131)	(0.0158)	(0.0185)
Observations	10,386	13,694	13,799	13,808	13,819	13,809
Average log count of taxpayers	1.49	3.43	4.08	4.67	4.52	4.49

Notes: Each cell in this table reports the coefficient of a regression of the log count of households on a measure of (category specific) net-of-tax rate, schooling expenditures and non-schooling expenditures for the set of households with children (Panel A) and without children (Panel B) under 12 years of age. We regress $\ln TP_{it} = \beta_1 \ln(1-\tau_{it}) + \beta_2 \ln S_{it} + \beta_3 \ln NS_{it} + \beta\prime\mathbf{X} + \alpha_i\gamma_{MSod\times t} + \lambda_t + \varepsilon_{it}$
where TP_{it} is the number of households in municipality i at time t. All specifications include Municipality, Year and MS Region Fixed Effects. Standard errors in parentheses, with one-way clustering by municipality. Municipal covariates are: unemployment,left-wing and right-wing orientation, share of people $\geq$ 65y, share of foreign population, share of people $\leq$15y, average wealth tax. Column (1) includes all households and uses a weighted tax rate. Columns (2) -(7) limit the sample to households at a given level of the national income distribution and use the average net of tax rate of the specific group. *$p < 0.10$,**$p < 0.05$, ***$p < 0.01$.

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