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Enea Baselgia, Isabel Z. Martínez

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Mobility Responses to Special Tax Regimes for the Super-Rich: Evidence from Switzerland

Abstract

We use a novel rich-list data set to estimate the sensitivity of the location choice of superrich foreigners to a special tax regime, under which wealthy foreigners are taxed on their living expenses, rather than their true income and wealth. We are the first to evaluate this controversial Swiss policy, and show that when some Swiss cantons abolished this practice, their stock of super-rich foreigners dropped by 43% as a consequence. We find no response for the Swiss super-rich, who were unaffected by the policy change.

JEL-Codes: H240, H710, H730, R230.

Keywords: super-rich, location-choice, tax mobility, expenditure-based taxation, preferential taxation, tax competition.

Enea Baselgia
ETH Zurich, KOF Swiss Economic Institute
Leonhardstrasse 21
Switzerland – 8092 Zurich
baselgia@kof.ethz.ch

Isabel Z. Martínez
ETH Zurich, KOF Swiss Economic Institute
Leonhardstrasse 21
Switzerland – 8092 Zurich
martinez@kof.ethz.ch

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1 Introduction

Switzerland is well known as a hiding place for large fortunes (Zucman, 2013, Alstadsæter et al., 2019, Alstadsæter et al., 2022) and for its mild tax climate, which attracts a considerable fraction of the global wealth elite. In April 2023, the number of billionaires per million inhabitants was 4 according to Forbes Magazine—more than twice that of the US. According to estimates by Shorrocks et al. (2022), of the estimated 261,157 adults around the world with at least US$ 50 million in net worth in 2022, 1.22% were living in Switzerland—a country that is home to only 0.12% of the global adult population.

One important reason why Switzerland is so attractive for wealthy individuals from around the globe is a special tax privilege the small country offers to wealthy foreigners: the so-called expenditure based taxation. Those eligible for this special tax regime pay taxes on their (and their spouse's and dependents') *global living expenses*, rather than on their true income and wealth. Living expenses are defined broadly and include all expenditures for food, clothing, and housing, taxes and social security contributions (around 25,000 CHF per adult and year), alimony payments, remunerations paid to household employees (in cash and in kind), expenses for education and leisure (sports, travel, cultural events, hobbies), for health and wellness cures, and costs of keeping pets (riding horses, etc.), as well as maintenance and operating costs of cars, motorboats, yachts, airplanes, etc. Although it can be considered a special form of a consumption tax, the scheme is often referred to as "lump-sum taxation" or "tax deals". Indeed, in the past it was not always clear how strict tax administrations were in practice, whether they took into account, e.g., all global expenditures or rather just expenditures in Switzerland, or updated the base every year. To be eligible, taxpayers must further not have any kind of labor income earned in Switzerland (but they have to declare capital incomes earned in Switzerland), and they must not be Swiss citizens.

Like the banking secrecy, this tax scheme has a long tradition in Switzerland, dating back to the late 19th century. And just like the banking secrecy, these tax privileges came under fire internationally as well as in the country itself, in particular in the aftermath of the global financial crisis in 2008. While other countries were concerned about erosion of their tax base due to such schemes, the domestic policy discussions concerned principles of fair taxation.

As a result, several of the Swiss states (called cantons) voted to abolish the practice, and eventually the conditions were at least tightened at the federal level. In particular, lower bounds introduced by the law should ensure a minimum level of taxation.[1] The scheme nevertheless remains highly attractive, in particular for super-rich foreigners. In 2018, a total of 4,557 taxpayers were still taxed according to their expenditures.[2]

[1] The Federal Income Tax defines the following lower bounds (whichever is highest is applied): 400,000 CHF, or seven times the annual rental value of the home, or the sum of gross incomes from capital and IP earned in Switzerland and incomes earned abroad for which the taxpayer claims full or partial relief from foreign taxes. Appendix Table B1 provides a detailed overview of all requirements across all cantons and when they were implemented.

[2] On average, they paid CHF 180,162 (approx. 176,000 US Dollars in 2018) in taxes, with they highest tax bill amounting

Proponents of the policy argue that this scheme helps attracting super-rich taxpayers from abroad who would otherwise not locate in Switzerland. Yet little is known about how the location choices of the super-rich depend on the controversial tax privileges Switzerland offers to wealthy foreigners. We fill this gap by examining the location choices of the super-rich—the tiny wealthy elite belonging to the top 0.01% of wealth holders in Switzerland—in response to expenditure-based taxation and its removal in some cantons. Due to the lack of access to individual panel data on expenditure-based taxpayers from administrative data, the behavioral responses to this policy change have never been studied in previous research. We overcome this obstacle by using a newly compiled rich list data set (see Baselgia and Martínez, 2024), which contains the small but highly relevant subset of approximately 150 super-wealthy foreigners who benefit from this practice each year.

Like the U.S., Switzerland is a federation where each of the 26 federal states, the cantons, enjoy large freedom in tax matters. They set their own rates for the cantonal income and wealth tax, and they offer different deductions and tax reductions. To estimate the role the tax schemes plays for location choices, we exploit that between 2010 and 2014, in light of the aforementioned fairness concerns, five cantons repealed expenditure-based taxation from their cantonal tax codes following popular or parliamentary initiatives.[3] Since income and wealth taxation is based on the canton and municipality of residence, this tax scheme is not available anymore to wealthy foreigners living in these cantons. Their local and cantonal taxes follow regular taxation.[4] A national vote to abolish the practice all together did not pass the ballots in 2014, and since then, no further attempts have been made to abolish the practice within individual cantons. However, requirements were tightened in 2016 in response to the controversy of the scheme (see Appendix Table B1 for details).

To quantify the causal effect of the removal of expenditure-based taxation on the location choices of the super-rich, we employ two alternative identification strategies. We first estimate standard difference-in-differences models along with corresponding event studies. In a second approach, we follow the empirical strategy presented in Agrawal and Foremny (2019), which builds on Moretti and Wilson (2017), and that results from spatial equilibrium in a location choice model. Both our empirical approaches show that removing this preferential tax treatment reduces the stock of super-rich foreigners by approximately 43% five years after the abolition. Reassuringly, we find no effect on the location choice of Swiss-born super-rich taxpayers, who are not eligible for this preferential tax scheme and were therefore not affected by the cantonal repeal of the practice.

to CHF 11,967,953 (approx. 11,705,000 US Dollars in 2018). Source: FDK (Konferenz der kantonalen Finanzdirektorinnen und Finanzdirektoren) https://www.fdk-cdf.ch/themen/steuerpolitik/aufwandbesteuerung. 2018 is the last available year, as cantons have discontinued the publication of this statistic.

[3] Blankart and Margraf (2011) study voting behavior in the proposed abolition expenditure-based taxation in the canton of Zurich in 2010.

[4] For the Federal Income Tax, the scheme is in principle still available, but in practice there are hardly any taxpayers claiming expenditure-based taxation at the federal level if they live in a canton that abolished expenditure-based taxation.

Using approximate estimates of the implied changes in effective tax rates, we then use our estimates to compute the implied mobility elasticity with respect to taxes. Our back-of-the-envelope calculations suggest that the elasticity of the stock of super-rich taxpayers in a canton with respect to the total net-of-tax rate on wealth lies in the range of 29.8–32.0. With respect to a revenue-equivalent tax on capital income rather than a tax on wealth, our estimates would imply an elasticity of the stock of super-rich taxpayers of 1.3–1.4.

Our paper contributes to the literature on spatial mobility of taxpayers in response to local tax differentials. Several studies have shown that taxpayers in Switzerland, especially the rich, tend to sort into low-tax cantons and municipalities (e.g., Schmidheiny, 2006; Schmidheiny and Slotwinski, 2018; Martínez, 2022; Brülhart et al., 2022). However, we are the first to study the effect of the abolition of expenditure-based taxation in Swiss cantons on the location choices of the super-rich, who belong to the global elite of high net worth individuals.

While other countries try to attract high-income taxpayers with tax privileges tailored to foreigners (e.g., Denmark, see Kleven et al., 2014, or the UK, see Advani et al., 2023), those schemes differ substantially from the Swiss expenditure-based taxation, because under the Swiss scheme, taxpayers are not allowed to earn any labor income in Switzerland. Expenditure-based taxation is also not limited to a certain number of years (such as, e.g., in the Danish case), nor is it tailored to a specific group of professionals like football players (Kleven et al., 2013), or star scientists (Akcigit et al., 2016). Rather, the target group are wealthy individuals or families who either pursue their economic activities abroad, or who are rentiers in the classic sense. Due to Switzerland's pioneering position in the competition for super-rich taxpayers from around the globe, the Swiss context therefore provides a particularly fruitful setting to study the question of how sensitive the location choices of the super-rich global elites are to such preferential tax treatment.

Two recent papers are closely related to ours. Moretti and Wilson (2023) use the Forbes 400 rich list to study how the super-rich in the US respond to differences in bequest taxation across US states. The number of Forbes 400 individuals fell by 35% in US states that still apply estate taxes compared to those that do not—yet estate taxes are conceptually very different to annual income and wealth taxes, limiting comparability.

Advani et al. (2023) study international migration responses in context of the UK "non-dom" system. In contrast to large elasticities documented in earlier papers, they find hardly any out-migration response one year after limitations on the "non-dom" system were imposed. They estimate that less than 5% left the UK in response and report a semi-elasticity w.r.t. the *flow* (not stock, as we do) of 0.26 and no more than 0.4. Unfortunately, their estimates are constrained by two limitations: i) they are limited to the year immediately following the policy change, thereby not allowing for a longer response time (which we find is important in our setting). ii) they only include out-

migration, without taking into account changes in in-flows or the overall number of affected taxpayers, as we do. Yet even setting these methodological differences aside, it seems likely that the estimates for the UK case are lower than those for the Swiss case, due to the different rules governing the respective tax privileges. The "non-dom" system is tailored to individuals with investment incomes earned abroad. "Non-dom" taxpayers do not need to be super-rich, they may earn labor incomes in the UK (indeed, many have employment income as their main income source), and they are allowed to possess UK nationality. In addition, the UK reform affected long-stayers that had been in the UK for at least 15 of the last 20 years or those born in the UK to a UK father. These taxpayers are likely more strongly attached to the UK than the super-rich foreigners we study are to Switzerland. In line with the conclusion by Kleven et al. (2020), these contrasts highlight why elasticity estimates likely differ substantially across countries and institutional settings.

Elasticity estimates are not only context-dependent, the reported elasticites often differ in their definition between studies, further complicating a comparison of estimates. Our elasticity estimates are similar to some of the previous estimates of within-country mobility of top earners (e.g., Martínez, 2022; Schmidheiny and Slotwinski, 2018; Moretti and Wilson, 2017), but almost four times larger than what Agrawal et al. (2023) find for responses to the Spanish wealth tax. Furthermore, our estimated elasticities are much larger than in Jakobsen et al. (2024), who study responses of *international* migration to wealth taxation. Brülhart et al. (2022) also report smaller estimates with respect to the wealth tax in the Swiss context, but their analysis refers to all Swiss taxpayers, not just super-rich foreigners, who are expected to be more mobile. In addition, the outcome in Brülhart et al. (2022) is taxable wealth, not taxpayers. In particular for expenditure-based taxpayers, the two elasticities are going to differ: while these super-rich individuals are likely highly sensitive to taxation, the wealth tax base observed for them in tax data is heavily underestimated, such that even if individuals respond strongly, the taxable wealth would seem to respond less.

The remainder of this article is organized as follows. Section 2 describes the institutional setting, followed by a description of the data in Section 3. In Section 4, we present our empirical analysis. Section 5 concludes.

2 Institutional Background

2.1 Income and Wealth Taxation in Switzerland

The Swiss tax system is characterized by strong fiscal federalism. Taxation is residence based, such that the canton and municipality of residence have a strong influence on the effective tax burden. Cantons tax income and wealth, setting their own tax rates. The tax base is harmonized across cantons and very comprehensive: all income and wealth earned or held within or outside of Switzerland enter the tax base.[5] No distinction between the

[5] With the exception of pension funds, which are tax-exempt.

source of income and wealth is made.

At the federal level, only income is taxed (besides corporate taxes and indirect taxes like the VAT). The cantons collect taxes for all three government layers. Married taxpayers have to file jointly and hence are considered as one tax unit.[6]

2.2 Expenditure-Based Taxation for Wealthy Foreigners

Wealthy foreigners without Swiss citizenship who take residence in Switzerland but do not earn any labor income in Switzerland can opt for a preferential tax treatment known as expenditure-based or lump sum taxation (sometimes mistakenly referred to as "tax deals"). This preferential tax scheme is explicitly aimed at attracting wealthy foreigners to Switzerland. Swiss citizens are not eligible. While expenditure-based taxpayers can earn labor income abroad, they cannot earn any type of labor income from *within* Switzerland. A French tennis player, for example, could not play the Basel ATP without having to give up the preferential tax treatment, as this would be considered work. A foreign CEO may be eligible if she works for a foreign firm, but not if she works for a firm domiciled in Switzerland. As married couples always file jointly in Switzerland, both spouses have to fulfill the requirements.

The scheme has been in place in different cantons since the late 19th century and was introduced at the federal level in 1934. Similar tax regimes exist in the UK (known as the "non-dom" system, dating back to 1799), Belgium, Austria, and Italy. Under the "non-dom" system, however, eligible taxpayers are allowed to work in the UK, but claim their permanent domicile to be outside of the UK. Investment income from abroad is only taxed when transferred into the UK. Under the Swiss system, eligible taxpayers claim Switzerland as their main domicile, but are not allowed to earn labor income within Switzerland. Incomes earned abroad can be transferred freely to Switzerland.

As the name suggests, the *tax base* for these taxpayers is not their true income and wealth, but their total annual living expenses. These are defined comprehensively and include the cost of living for themselves and their dependents (living in Switzerland or abroad), personal expenses, expenses for house personnel and maintenance, as well as other recurring expenses around the world, e.g., for private jets, yachts, holiday homes, or large estates and lands abroad. Cantonal and federal tax laws define some minimum values for the cost of living—and hence, the tax base. While there are written rules and guidelines regarding the estimation of expenses, authorities asses the tax base case by case. The income tax base is then replaced with the estimated expenses. For the wealth tax, a multiple of the expenses, typically by factor 20, serves as tax base in most cantons. Appendix Table B1 gives an overview of all specifics in each canton.[7]

[6] Hänni (2021) provides a detailed description of the Swiss tax system, including recent changes and developments. The vast literature on Swiss tax competition at work includes, i.a., Feld and Kirchgässner (2001); Feld and Reulier (2005); Schmidheiny (2006); Luthi and Schmidheiny (2014); Brülhart and Parchet (2014); Eugster and Parchet (2019); Parchet (2019); Brülhart et al. (2022).

[7] In a companion paper (Baselgia and Martínez, 2024), we discuss the implications of this preferential tax treatment for studying inequality in Switzerland using tax data.

Importantly, expenditure-based taxpayers differ from regular taxpayers only in terms of the tax base. The standard tax rates defined in the cantonal and federal tax laws are applied. Foreigners have an incentive to opt for this form of taxation if their overall living expenses are lower than their true income and/or the multiple of the expenses is significantly lower than their total global net wealth. Unfortunately, we lack data that would allow us to quantify by how much the true tax bases are undervalued under this scheme.[8] The scheme can further significantly reduce taxpayers' cost of tax filing and compliance. In 2018, 4,557 persons—slightly less than 0.1% of all taxpayers—were subject to expenditure-based taxation in Switzerland.

2.3 Abolition of Expenditure-Based Taxation Across Cantons

Expenditure-based taxation has become the subject of heavy criticism over the past decade, both from outside and within the country. In light of these discussions, several cantons proposed to abolish this practice, usually holding a popular vote.[9] Zürich (2010), Schaffhausen (2012), Appenzell Ausserrhoden (2012), Basel Stadt (2014), and Basel-Landschaft (2014) adopted corresponding proposals and removed the option of expenditure-based taxation. Seven other cantons held a popular vote between 2011 and 2014 that did not find a majority (see Figure B1). Table B2 in the Appendix lists dates and results of all the popular votes held. At the national level, a popular vote to abolish expenditure-based taxation was rejected by 59.2% in 2014. After this date, there were no further attempts to repeal the practice at the cantonal level.

3 Data

In light of the highly cherished Swiss tax secrecy, neither the Federal Tax Administration nor any cantonal tax administration is willing to grant access to any (micro) data on expenditure-based taxpayers.[10] To shed light on the effect of expenditure-based taxation, we therefore turn to Swiss rich list data, compiled by Baselgia and Martínez (2024). This data set is based on the annual rankings of the 300 richest individuals and families in Switzerland by the business magazine BILANZ, the equivalent to the Forbes 400 list in the United States. It contains the 300 richest individuals and families with net market wealth well above 100m CHF. We describe this newly compiled panel data set in much detail in our companion paper (see Baselgia and Martínez, 2024).

[8] Anecdotal evidence suggests that the undervaluation can become extremely large in certain cases: when the richest Swiss-based billionaire, IKEA founder Ingvar Kamprad, left the country in 2013, it became public that he was not even among the top 15 taxpayers in his longtime tax domicile of Epalinges (a village of less than 10,000 inhabitants), because he was taxed according to his expenditures. See: https://www.nzz.ch/schweiz/minus-ein-pauschalbesteuerter-1.18106985.

[9] Blankart and Margraf (2011) study voting behavior in the proposed abolition expenditure-based taxation in the canton of Zurich in 2010.

[10] The following episode illustrates the reluctance to shed light on expenditure-based taxation in practice: in 2012, in the run-up to the vote in 2014 to abolish lump-sum taxation in the canton of Bern, Bernese National Councillor Margret Kiener Nellen requested insight into the tax returns of expenditure-based taxpayers from the cantonal finance department. A five-year legal dispute followed, which was only settled by a Federal Court ruling in 2017, granting her access. In the meantime, however, the Bernese Tax Act has been tightened and access has become even more difficult (Der Bund, 2017, Federal Court Ruling 31.08.2017, BGer 1C_447/2016, 1C_448/2016, 1C_449/2016).

For the analysis in this paper, we use the number of super-rich per year and canton for the period 1999–2020, further distinguishing between foreign-born and Swiss-born super-rich—as only rich foreigners are affected by the policy change. In any given year, roughly half of all super-rich in our data are foreign-born. While the rich lists do not contain information on the tax-status of super-rich foreigners, we assume based on their large wealth and general eligibility, that foreign-born individuals on the list are subject to expenditure-based taxation. Appendix Figure B2 shows the geographical distribution of the super-rich across cantons. Importantly, we focus on super-rich while they are in Switzerland. We do not follow those who leave Switzerland using, e.g., foreign rich lists. When a super-rich person departs Switzerland, they drop from our sample.

4 Responses in Location Choices of Super-Rich Foreigners

4.1 Difference-in-Differences Estimation

To quantify the causal impact of the elimination of expenditure-based taxation on the location decisions of the super-rich, we first apply a difference-in-differences (DD) strategy and estimate event studies, showing how the dynamic effect of abolishing the policy played out over time. First, we estimate various specifications of a two-way fixed effects (TWFE) DD model of the type

$$\ln N_{c,t} = \beta^{DD} \cdot \Gamma_{c,t} + \theta_c + \theta_t + \hat{\Theta}_c^{pre} \cdot t + \Psi X_{c,t} + \epsilon_{c,t}, \tag{1}$$

where $\ln N_{c,t}$ is the log number of (foreign-born) super-rich living in canton c at time t.[11] $\Gamma_{c,t}$ is a treatment interaction dummy, indicating the post-reform period in an abolition canton. Treatment is defined in the year prior to the statutory removal (e.g., $\Gamma_{ZH,2009} = 1$ for the canton of Zurich), to allow for responses as early as in the year the abolition was voted on. β^{DD}, our parameter of interest, captures the effect of the abolition of expenditure-based taxation on the number of (foreign-born) super-rich in the treatment cantons compared to cantons that did not abolish the preferential tax scheme. Thus, β^{DD} provides an estimate of the percentage change ($\approx \exp(\beta^{DD}) - 1$) in the number of foreign-born super-rich related to the removal of the preferential tax treatment.[12] Since the effective tax burden is lower under expenditure-based than under regular taxation (i.e., if $\Gamma_{c,t} = 0$), we expect a negative sign for β^{DD}.

With $\hat{\Theta}_c^{pre} \cdot t$, we aim to control for different pre-trends between treatment and control cantons. Specifically, we apply the "pre-trend specification" suggested by Goodman-Bacon (2019). That is, we regress our outcomes on all the fixed effects and control

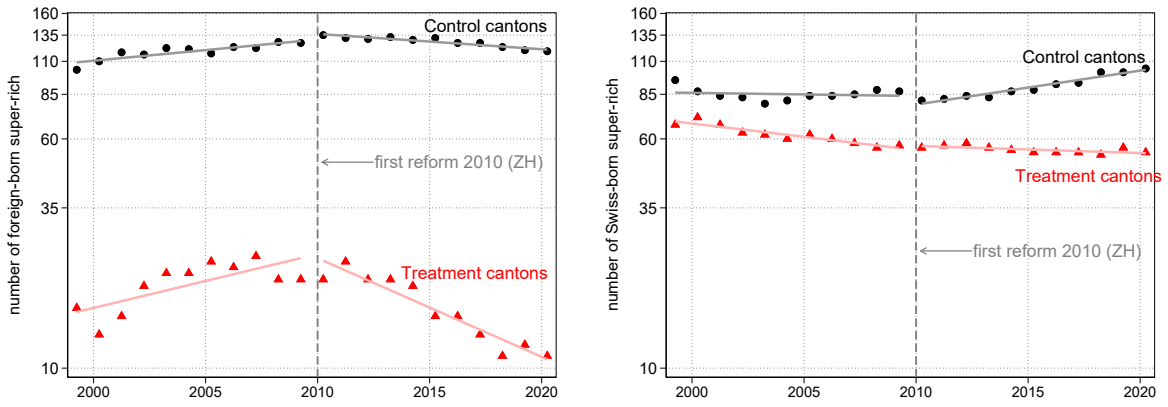
[11] Since we are working with only a small sample of taxpayers, in some smaller cantons we do not observe any super-rich for some years (see Figure B2). By estimating Equation (1), these observations are dropped from the model, since the logarithm of zero is undefined. We address this sample selection issue by using a Poisson pseudo-maximum likelihood (PPML) estimation strategy as a robustness exercise, see Appendix Table B6 for further details. For a detailed discussion of PPML estimation, see the seminal contribution by Santos Silva and Tenreyro (2006).

[12] Note, that the β%-change interpretation only holds approximately and for small changes. As we estimate sizeable β-coefficients in some specifications, we convert them into percentage changes when describing them in the main text by using the conversion $\exp(\beta) - 1$. In all tables and figures in this paper, however, we report the estimated β-coefficient.

variables and a differential linear trend for treated and non-treated cantons, using only years *before* any of the cantons were treated (i.e., up to 2008, as Zurich voted in 2009). We construct the residuals from this regression for the *whole* sample and use these residuals as the outcome in our main regression.

The vector $X_{c,t}$ adds the following time-varying canton controls in logarithms: top average net-of-tax rate on wealth, top average net-of-tax rate on income, the net-of-tax rates on inheritance for children and non-related individuals respectively, and the share of foreigners in the total population (see Appendix A for details). Standard errors are clustered at the canton level, the level of treatment.

The reform should not have had a direct effect on the location decisions of the Swiss-born super-rich, as they were never eligible for expenditure-based taxation. We therefore conduct the same analysis separately for the affected foreign-born and the unaffected Swiss-born super-rich, in which case we expect $\beta^{DD} = 0$.[13]



(a) Foreign-born

(b) Swiss-born

Figure 1: Parallel Trends: No. of Super-Rich in Treated and Non-Treated Cantons

Note: Panel (a) shows the number of the foreign-born super-rich living in cantons that eventually abolished expenditure-based taxation (red triangles) and those that did not (black dots). Likewise, Panel (b) shows the number of Swiss-born super-rich living in treatment (red triangles) and non-treatment (black dots) cantons. Note that the y-axis is on a logarithmic scale. The dashed vertical line in 2010 indicates the year in which the first canton (ZH) abolished expenditure-based taxation, further abolitions took place in 2012 and 2014 (see Tab. B2 for details).

The central identifying assumption for this DD analysis are parallel trends in the outcome of interest between the treated and non-treated cantons in the post-treatment period if the treated cantons had not been treated. This assumption cannot be tested directly, but pre-treatment trends serve as a reference. Figure 1.a) shows the trends in the number of super-rich for foreign-born living in treatment (red triangles) and control cantons (black dots) on a logarithmic scale. While abolition cantons were home to only relatively few super-rich, their log number was increasing in both treatment and control cantons prior to the repeals starting in 2010. Afterwards we see a clear trend reversal for the foreign-born super-rich in the treatment cantons, but not in the non-treated cantons. Figure 1.b) shows the trends for the Swiss-born super-rich. While abolishing cantons had

[13] We use this additional layer in a triple-DD approach as a robustness exercise in Section 4.2.

apparently not been among the favorite for wealthy foreigners, almost 45% of all Swiss-born super-rich lived in those cantons in 1999. But for the Swiss-born super-rich, we see a declining trend in the decade prior to 2010. The gap between the treatment and control cantons widens continuously over the entire sample period, including the post-treatment period.

DD Results

Table 1 shows the TWFE DD estimates following Equation (1) using standard OLS for four different samples. The abolition should only have an affect in the sample of foreign-born super-rich (Panel A). Note that because with the data at hand we observe only the richest of all expenditure-based taxpayers, most of the variation we capture comes from the repeal in the largest Swiss canton of Zurich (home to about 18% of the Swiss population). This can also be inferred from Figure B2.b). In the sample of Swiss-born super-rich (Panel B), we would not expect to see any effects.[14] Given that foreign-born make up almost half of all super-rich, we also run the estimation on the full sample of the super-rich in the BILANZ rich list (Panel C), to see whether responses by foreign-born super-rich are large enough to be reflected in the full sample. In Panel D, finally, we estimate Equation 1 for the period 2003-2020 using an even broader population: all taxpayers with net wealth exceeding 10m CHF as reported in official wealth tax statistics.[15] This sample should in principle include the majority of all expenditure-based taxpayers, and hence all cantons are included in the analysis. At the same time, this sample also contains many unaffected taxpayers. We therefore take this as an additional test for a potential response by unaffected taxpayers.

Column 1) reports the B^{DD} estimates with only time- and canton-fixed effects. The estimates suggest that eliminating expenditure-based taxation reduces the number of super-rich by 24-28% across all sub-samples ($\beta^{DD} \in [-0.27, -0.33]$). For the Panels B to D, however, this result is entirely driven by the differential pre-trend between treated and non-treated cantons. Once we control for these trends (column 2), the effect of the reform vanishes: the coefficient changes sign and/or is very close to zero with large confidence intervals. Only for the foreign-born super-rich (Panel A) who were effectively affected by the policy change, the coefficient remains statistically significant after controlling for differential per-trends, and increasing in magnitude to $\beta^{DD} = -0.58$. Sequentially adding time-varying controls (columns 3–6) only marginally changes the results, which remain significant at the 1% level across all specifications. In our preferred specification including all controls, we find an economically large negative effect of around -43% ($\beta^{DD} = -0.56$).

Overall, the static DD specifications suggest that super-rich foreigners have been responsive to the abolition of expenditure-based taxation. The removal of expenditure-based taxation reduced the number of foreign-born super-rich by 42-44% ($\beta^{DD} \in [-0.55, -0.58]$;

[14] In Section 4.2, we present estimation results from a triple-DD model as an alternative identification strategy.
[15] Appendix A provides details on the data used in Panel D and the source of the control variables.

see Footnote 12) in the affected cantons, while it had no effect on the location choices of Swiss-born super-rich—just like one would expect, given the nature of the tax policy. The response of rich, foreign-born taxpayers, however, seems to be too small to be detected in larger samples that include all super-rich. As we discuss below, these results prove very robust to potential concerns regarding our estimation strategy.

Table 1: Abolition of Expenditure-Based Taxation – Static DD Estimation Results

Model	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Foreign-Born Super-Rich, 1999-2020					
β^{DD}	−0.31***	−0.58***	−0.57***	−0.57***	−0.55***	−0.56***
	(0.10)	(0.11)	(0.11)	(0.11)	(0.12)	(0.11)
β^{CS}	−0.37***	−0.51***	−0.47***	−0.49***	−0.82***	−0.57***
	(0.08)	(0.08)	(0.06)	(0.06)	(0.20)	(0.10)
No. of obs.	411	411	411	411	411	411
	Panel B: Swiss-Born Super-Rich, 1999-2020					
β^{DD}	−0.27***	0.12	0.14	0.12	0.01	0.02
	(0.08)	(0.07)	(0.08)	(0.08)	(0.07)	(0.07)
β^{CS}	−0.13**	0.08	0.10*	0.11*	−0.03	−0.10
	(0.06)	(0.07)	(0.06)	(0.06)	(0.12)	(0.20)
No. of obs.	466	466	466	466	466	466
	Panel C: All Super-Rich, 1999-2020					
β^{DD}	−0.27***	0.02	0.02	0.01	−0.03	−0.02
	(0.08)	(0.08)	(0.09)	(0.09)	(0.08)	(0.08)
β^{CS}	−0.12*	0.04	0.07	0.09	−0.11	0.01
	(0.07)	(0.07)	(0.07)	(0.06)	(0.18)	(0.12)
No. of obs.	506	506	506	506	506	506
	Panel D: Rich Taxpayers, 2003-2020					
β^{DD}	−0.33***	0.00	0.01	−0.02	−0.04	−0.10
	(0.08)	(0.08)	(0.07)	(0.07)	(0.07)	(0.07)
β^{CS}	−0.20***	0.01	0.01	0.00	−0.01	−0.03
	(0.04)	(0.04)	(0.03)	(0.03)	(0.05)	(0.06)
No. of obs.	468	468	468	468	468	468
Controls	(1)	(2)	(3)	(4)	(5)	(6)
Canton fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Canton-treatment linear trend	No	Yes	Yes	Yes	Yes	Yes
Top average wealth-tax rates	No	No	Yes	Yes	Yes	Yes
Top average income-tax rates	No	No	No	Yes	Yes	Yes
Inheritance-tax rates	No	No	No	No	Yes	Yes
Share of foreigners	No	No	No	No	No	Yes

Note: This table shows the estimation results of the model presented in Equation (1) using OLS. Panel A uses the number of foreign-born super-rich in our BILANZ data set as the dependent variable. More detailed results for this sub-sample, including estimation coefficients on the control variables, are shown in Appendix Table B3. Analogously, Panel B employs the number of Swiss-born super-rich (detailed results reported in Table B4 in the Appendix). Panel C utilizes the full sample of super-rich. Panel D employs an alternative sample, namely the number of rich taxpayers (i.e., taxpayers with net wealth greater than 10m CHF). In columns (2) to (6), we control for pre-trends using de-trended residuals as outcome variable (see text for details). Standard errors are clustered by canton and are shown in parentheses, below the coefficients. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Robustness of DD Results

Our results are robust to a series of adjustments and alterations in the empirical estimation. First, note that our baseline results on the foreign-born super-rich are not purely driven by the inclusion of canton-treatment time trends, but hold in all specifications including controls even in the absence of such trends (see Appendix Table B5). The estimated coefficient of interest drops to -0.31 in the full model without trend (compared to -0.56 with trend), but is likewise statistically significant at the 1% level.

Second, in our setting, timing of treatment varies across cantons, and the treatment could be heterogeneous across cantons, hence the static TWFE estimator may potentially be biased (De Chaisemartin and d'Haultfoeuille, 2020; Goodman-Bacon, 2021; Borusyak et al., 2024; see Roth et al. (2023) and De Chaisemartin and d'Haultfoeuille (2023) for a summary of the fast growing literature on TWFE DD estimation). In Table 1, we therefore also report β^{CS}: the static DD results based on the new estimator by Callaway and Sant'Anna (2021). This is one of several novel alternative estimators that address the issue of "negative weighting". Across all samples A to D and regression specifications (columns 2–7), the canonical TWFE DD estimator and the Callaway and Sant'Anna (2021) DD estimator yield very similar results. Notably, in the full specification for the foreign-born super-rich, the β^{CS} point estimate at -0.57 is virtually identical. As we show later in Figure B5, our dynamic DD results are also robust to other recent estimators, such as those proposed by De Chaisemartin and d'Haultfoeuille (2020) and Borusyak et al. (2024).

Third, our data set on the super-rich contains true zeros, i.e., there are a few cantons where no (foreign-born) super-rich from our rich list data resides. As we specify our model in logs, observations with a value of zero in the dependent variable are omitted from the estimation. A potential concern is that this sample selection might affect our estimation results. In Appendix Table B6 we demonstrate that this is not an issue in our empirical setting, by employing a Poisson pseudo-maximum likelihood (PPML) estimation strategy capable of incorporating zeros. Whether observations with zeros are included in the PPML estimation or not has hardly any effect on the estimates. If anything, restricting the sample to strictly positive values only yields slightly lower estimates in the PPML estimation.[16]

Fourth, because we do not observe actual expenditure-based super-rich taxpayers, but rather infer their tax status from the place of birth we measure our outcome of interest with error. This will render the estimates less precise, increasing standard errors.

[16]It is critical to note that the results from Table 1 (OLS estimation) and Appendix Table B6 (PPML estimation) are not directly comparable, with the exception of column 1. This is due to the fact that the PPML estimation does not allow us to control for pre-trends between the treatment and control groups, as suggested by Goodman-Bacon (2019) and implemented in our DD OLS analysis. In our DD OLS estimations, regression residuals are used as outcome variables, and these by default contain both positive and negative values. However, PPML cannot incorporate negative values. Therefore, the results presented in Appendix Table B6 should not be interpreted causally, as they are vulnerable to the pre-trend bias illustrated in Figure 1 (we do not control for canton-treatment trends at all in Appendix Table B6). The sole purpose of the robustness exercise presented in Appendix Table B6 is to show that sample selection due to the omission of zeros does not affect our estimation results.

Fifth, one may be concerned about the violation of the stable unit treatment value assumption (SUTVA) which would bias our estimates upward. As we discuss below, migration to a non-treatment canton is not the main mechanism driving our results. Furthermore, due to the different sizes of the treatment and control groups, the few individuals who do move within Switzerland, only correspond 3% of the size of the pre-treatment control group. Given our large effect sizes, this small within-country migration is unlikely to affect our results. To alleviate any remaining concerns regarding SUTVA violations, in Section 4.3 we turn to an alternative estimation approach that arises from a spatial equilibrium in a location decision model, which parametrically precludes spillover effects to non-treated cantons. Reassuringly, this alternative estimation strategy yields highly similar results. Hence, we conclude that (potential) SUTVA violations are unlikely to affect our DD analysis in a meaningful way.

4.2 Event Study Specification

To further assess the validity of the parallel trends assumption and to study the dynamic effects of the reform, we turn to event studies. Specifically, we estimate (versions of) the following event study model in logs using OLS:

$$\ln N_{c,t} = \sum_{j=-4}^{5} \beta_j^{DD} \cdot \Gamma_{c,t-j} + \theta_c + \theta_t + \hat{\Theta}_c^{pre} \cdot t + \Psi X_{c,t} + \epsilon_{c,t}. \tag{2}$$

As before, $\ln N_{c,t}$ is the log number of super-rich living in canton c at time t, and $\Gamma_{c,t}$ is a treatment indicator for the removal of expenditure-based taxation. θ_c and θ_t again refer to canton and year fixed effects, respectively. Analogous to the static specification in Equation 1, $\hat{\Theta}_c^{pre} \cdot t$ indicates that we control for the differential pre-trends between treatment and control cantons using residuals as outcomes (see Section 4.1 for details). The vector $X_{c,t}$ adds the same time-varying canton controls as in the static DD analysis. The endpoints in all our event study specifications are binned (see Schmidheiny and Siegloch, 2023). Standard errors are clustered at the canton level.

We show the dynamic reform effect between abolition and non-abolition cantons, β_j^{DD}, relative to the *second* year prior to the abolition of expenditure-based taxation, i.e., normalizing $\beta_{-2}^{DD} = 0$. This allows for the possibility that some super-rich already chose different locations before the repeal, since it was preceded by political discussions and popular referenda.

Event Study Results

Figure 2 presents the estimates of our main event study specifications for the foreign-born super-rich. The pre-treatment estimates are stable and statistically not significantly different from zero, both with and without controlling for time-varying confounders. Hence, the identifying parallel trends assumption holds in our setting. The dynamic DD results shown in Figure 2 corroborate our previous finding: the abolition of expenditure-based

taxation leads to a significant reduction in the number of foreign-born super-rich, with the effect materializing particularly in the medium run (see also discussion below). Appendix Figure B3 presents the analogous results for Swiss-born and all super-rich as well as rich taxpayers. For all those samples, we estimate a relatively precise dynamic zero effect.

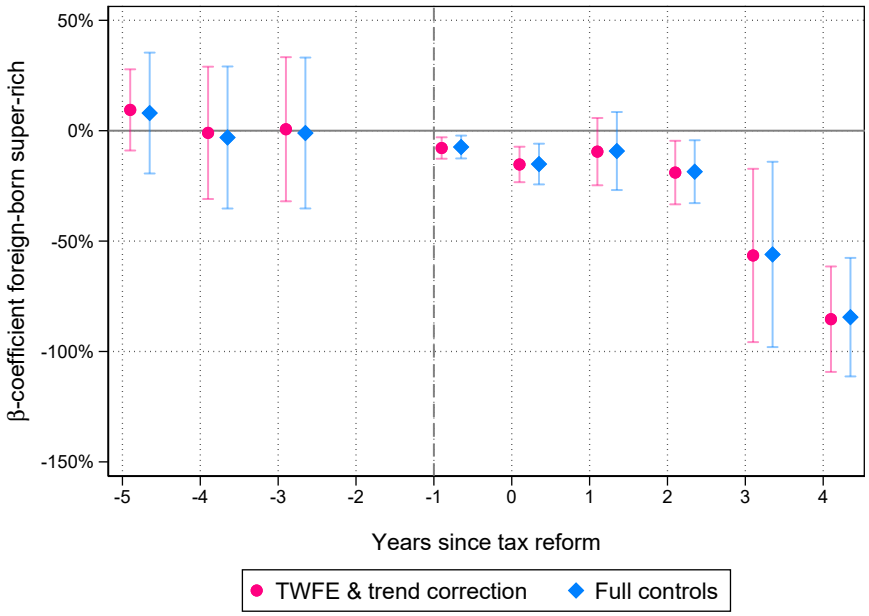


Figure 2: Cumulative Event Study – Foreign-Born Super-Rich

Note: This figure shows the cumulative effects of removing expenditure-based taxation on the log number of foreign-born super-rich in abolition cantons (see Equation 2). Estimates are relative to the second year prior to the abolition ($t = -2$), allowing for anticipation effects / early responses. We control for pre-trends using de-trended residuals as outcome variable (see text for details). The red circles correspond to a specification of Equation 2 which contains only year and canton fixed effects as well as the trend correction. The blue diamonds correspond to a specification that additionally contains the full vector of time-varying cantonal controls $X_{c,t}$. Point estimates are reported with their corresponding 95% confidence intervals, with standard errors clustered by canton. Appendix Figure B3 displays the analogous results for Swiss-born super-rich, all super-rich, and rich taxpayers.

The negative location choice effect of the foreign-born super-rich in response to the abolition of expenditure-based taxation does not materialize immediately after the reform. Appendix Table B7 shows that only 21% of the treated individuals in our sample had moved to an untreated canton five years after the repeal, and we find that none of them emigrated. Nevertheless, foreign-born individuals are twice as likely to move within Switzerland / half as likely to stay in their canton of origin than what could be expected from the marginal distributions of movers and stayers across all treated and untreated Swiss-born and foreign-born observations in our sample. Overall, foreigners are also more likely to exit the sample, while Swiss-born are less likely to exit the sample than expected under statistical independence. This makes sense, given that Swiss-born are likely more attached to their home country than foreigners. Swiss-born are also more likely to stay in their canton—especially if they live in a treatment canton. The Pearson χ^2 test statistic for the entire contingency Table B7 implies that the differences are statistically significant at the 1% level.

In addition to the small outmigration response, new arrivals or entrants in the rich list are also more likely to live in non-treated cantons that still offer a preferential tax treatment to foreigners (Appendix Table B8). Given the marginal distributions, Swiss-born are slightly more likely to live in a treatment canton than could be expected under statistical independence—although the differences are not large enough to be considered statistically significant.

Robustness of Events Study Results

Again, our results are robust to various alterations in the estimation. First, the estimated effects on the foreign-born super-rich are not conditional on normalizing our dynamic DD estimates relative to the second year prior to abolition (i.e. $\beta_{-2}^{DD} = 0$). Appendix Figure B4 illustrates the analogous results when we apply the standard practice of normalizing the estimates relative to the year before the reform (i.e., $\beta_{-1}^{DD} = 0$), and highlights that our findings remain largely unchanged.

Second, our event study results on the foreign-born super-rich are robust to using other modern dynamic DD estimators instead of the canonical TWFE estimator. Appendix Figure B5 shows corresponding event study results based on the DD estimators developed by De Chaisemartin and d'Haultfoeuille (2020) and Borusyak et al. (2024), respectively.

Third, as an additional empirical exercise, we use the fact that only the foreign-born but not the Swiss-born super-rich were affected by the repeal of the expenditure-based taxation in a triple difference-differences (DDD) estimation strategy. The DDD estimates (reported in Appendix Figure B6) are highly consistent with our main estimates for the foreign-born super-rich (see Figure 2). This is not surprising given that we estimate a virtually null effect for the Swiss-born super-rich (see Panel (a) of Figure B3).

Fourth, despite using the pre-trend specification suggested by Goodman-Bacon (2019), pre-trends are not estimated very precisely. It would in principle be possible that the large confidence bands mask a diverging trend between treatment and control cantons. We use the honest DD approach suggested by Rambachan and Roth (2023) as a sensitivity analysis. These confidence intervals account for the fact that there is estimation error both in the treatment effects estimates, and in our estimates of the pre-trends. The results remain statistically significant under the assumption that the post-treatment violations of parallel trends are no larger than 50% of the maximum pre-treatment violation of parallel trends (see Appendix Figure B7).

Lastly, another potential concern might be that abolition cantons lowered top tax rates on income and wealth to compensate for the tax increases faced by formerly expenditure-based taxpayers. In this case, our estimates would be a lower bound of the effect of the abolition. However, we find no effects on top average tax rates on income and wealth (see event study in Appendix Figure B8).

4.3 Spatial Equilibrium Identification Approach

In this section, we turn to a second, alternative estimation approach, arising from spatial equilibrium in a location choice model, first proposed by Moretti and Wilson (2017).[17] Following the adaptation by Agrawal and Foremny (2019), we compare the stock of super-rich across all canton pairs, and estimate how these relationships are affected by the unilateral repeal of expenditure-based taxation by some cantons. The key idea is to compute for each year the log ratio of the stock of the super-rich for each canton pair.[18] These canton-pair ratios then serve as the dependent variable in the model. A special feature of this empirical approach is that by using canton pairs, the number of observations is significantly larger than in the DD analysis in Section 4.1 and also allows us to include a more restrictive set of fixed effects. We estimate the following pairwise model:

$$\ln\left(\frac{N_{d,t}}{N_{o,t}}\right) = \beta^{SR} \cdot \Gamma_{do,t} + \theta_d + \theta_o + \theta_t + \hat{\Theta}_{do}^{pre} \cdot t + \Psi X_{do,t} + \epsilon_{do,t}, \tag{3}$$

where $\ln\left(N_{d,t}/N_{o,t}\right)$ is the log ratio of the super-rich across canton pairs, with d denoting the destination and o the origin canton. Note that we do not actually observe flows but only stocks, so there is effectively no origin or destination. We nevertheless stick to the notation of Agrawal and Foremny (2019). This phrasing is helpful for discussing the empirical set-up, as we do not have to refer to some arbitrary reference canton. This notation uniquely captures all canton-pair combinations. Because of how we define the right-hand side variables, it does not matter whether a canton enters the model in the numerator as a destination, or in the denominator as origin canton. As such, $\Gamma_{do,t} \equiv \Gamma_{d,t} - \Gamma_{o,t}$ is an indicator variable that equals 1 if destination canton d does *not* offer expenditure-based taxation in year t, but canton o does. Conversely, $\Gamma_{do,t}$ equals -1 if the destination canton d still provides expenditure-based taxation, but canton o does not. And third, $\Gamma_{do,t}$ equals 0 if either both cantons, d and o, offer expenditure-based taxation in year t or neither of them does. Hence, our empirical model imposes full symmetry on the estimated effects.[19]

β^{SR} is our parameter of interest. Its interpretation is as follows: removing expenditure-based taxation in canton d while holding the policy fixed in canton o, makes super-rich people less likely to live in canton d and more likely to live in canton o, as in canton

[17] For the theoretical models, the interested reader is referred to Moretti and Wilson (2017) for a flow model, and Agrawal and Foremny (2019) for a stock version of the same model. We confine here to our modified empirical model.

[18] Same as in our DD-OLS analysis in Table 1, cantons that do not host at least one super-rich are excluded from the estimation, but this does not drive our estimates. To alleviate concerns regarding sample selection due to the omission of zeros in the estimation, we perform two robustness checks. First, in Appendix Table B11 we provide the stock-ratio estimation results for a fixed sample, consisting of at least one foreign-born and one Swiss-born super-rich person per canton. Consequently, the estimates in Panels A to C of Table B11 are all based on the very same sample. These estimates closely align with our main results in Table 2, suggesting that sample selection is not a primary concern. Second, our PPML robustness exercise, shown in Table B6 in conjunction with the DD OLS estimation, has already established that omitting zeros hardly has any effect on the estimates in our empirical setting.

[19] We start from a situation where $\Gamma_{do,t} = 0$ for all canton pairs, since all cantons offer expendiutre-based taxation. If canton d abolishes expenditure-based taxation in year t but canton o does not, then $\Gamma_{do,t} = 1 - 0 = 1$ (or vice versa due to the symmetry imposed by $\Gamma_{do,t} = 0 - 1 = -1$), for as long as canton d does not offer but canton o does offer expenditure-based taxation. $\Gamma_{do,t}$ will switch back to zero only if either canton d reintroduces expenditure-based taxation (which never occurs in our setting), or if canton o removes it as well.

o the effective tax on income on wealth will be lower. The result is a decrease in the stock of super-rich in canton d relative to canton o. If the canton of origin o abolishes expenditure-based taxation but canton d does not, the interpretation is vice versa. If either both cantons, d and o, or neither of them abolish expenditure-based taxation, there is no policy change to differentially affect the stock of super-rich. By defining $\Gamma_{do,t} = 0$ for these canton pairs, these comparisons do not contribute to the estimation of β^{SR}. By putting more parametric structure on the problem than in the DD analysis, which may still suffer from minor SUTVA violations, we explicitly allow certain spillovers to other cantons: tax policy in canton d may affect the number of super-rich in canton o, by increasing the number of super-rich in canton o and thereby reducing the stock-ratio $\frac{N_{d,t}}{N_{o,t}}$.

The destination and origin fixed effects, θ_d and θ_o, capture amenities and other unobserved time-invariant characteristics in the destination and origin cantons. θ_t captures year fixed effects. As before, $\hat{\Theta}_{do}^{pre}$, controls for different pre-trends between treatment and control cantons (for details see Section 4.1). The vector $X_{do,t}$ adds the same control variables as employed in the DD analysis, but specified as log ratios for each of the canton pairs. We follow Agrawal and Foremny (2019) and employ three-way clustered standard errors at canton-pair, origin-year, and destination-year level.

Identification relies on the assumption that, in the absence of policy differences (i.e., no changes in $\Gamma_{do,t}$), and given the set of fixed effects, canton-pair specific time trends accounted for, and control variables, the canton-pair stocks of super-rich taxpayers remain constant over time. Any canton-pair specific unobservable factor correlated with both, the elimination of expenditure-based taxation and the location choice of the super-rich between a canton pair may jeopardize our identification strategy. Introducing destination and origin fixed effects separately is a conservative estimation procedure that likely captures much of the unobserved variation across canton pairs. Moreover, the event study analysis above provided evidence that the location decisions of the foreign-born super-rich do not precede but follow the tax reforms.

Stock Ratio Results

Table 2 presents the estimation results of Equation (3) for the years 1999 to 2020. As before, the results are presented separately for foreign-born super-rich (Panel A) and other samples (Panels B to D). Column 1) shows the estimates with only destination, origin, and year fixed effects. Again, we find a negative response of approximately 24-29% across all sub-samples ($\beta^{SR} \in [-0.28, -0.34]$). As in the DD analysis, however, the results for the Swiss-born super-rich, all super-rich, and rich taxpayer samples (Panels B-D) are entirely driven by the differential pre-trend between the treated and non-treated cantons. Once we control for such pre-trends, the effect disappears or, in the case of the Swiss-born, reverses sign. This estimate, however, does not remain significantly positive once we add further time-varying controls (see Columns 5–6).

In contrast, the results for the foreign-born super-rich in Panel A increase with the inclusion of $\hat{\Theta}_{do}^{pre}$ (Columns 2 ff.), and remain highly robust to the addition of further controls (Columns 3–6). Consistent with our DD analysis, we again find that the abolition of expenditure-based taxation caused a reduction in the stock of the super-rich by 42-44% compared to the cantons without such a reform ($\beta^{SR} \in [-0.55, -0.58]$). These results are throughout highly statistically significant at the 1% level across specifications in Columns 2–6 (based on three-way clustered standard errors).

Table 2: Stock Ratio Estimation across Canton Pairs

Model	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Foreign-Born Super-Rich, 1999-2020					
β^{SR}	−0.34***	−0.56***	−0.56***	−0.57***	−0.54***	−0.53***
	(0.09)	(0.09)	(0.10)	(0.10)	(0.10)	(0.09)
No. of obs.	3,671	3,671	3,671	3,671	3,671	3,671
No. of canton pairs	228	228	228	228	228	228
	Panel B: Swiss-Born Super-Rich, 1999-2020					
β^{SR}	−0.30***	0.12***	0.13***	0.11***	0.00	0.00
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
No. of obs.	4,719	4,719	4,719	4,719	4,719	4,719
No. of canton pairs	296	296	296	296	296	296
	Panel C: All Super-Rich, 1999-2020					
β^{SR}	−0.28***	0.03	0.03	0.01	−0.03	−0.01
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
No. of obs.	5,573	5,573	5,573	5,573	5,573	5,573
No. of canton pairs	299	299	299	299	299	299
	Panel D: Rich Taxpayers, 2003-2020					
β^{SR}	−0.33***	−0.03	−0.02	−0.04	−0.06*	−0.13***
	(0.04)	(0.03)	(0.04)	(0.03)	(0.03)	(0.03)
No. of obs.	5,850	5,850	5,850	5,850	5,850	5,850
No. of canton pairs	325	325	325	325	325	325
Controls	(1)	(2)	(3)	(4)	(5)	(6)
Destination Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Origin Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Canton-treatment linear trend	No	Yes	Yes	Yes	Yes	Yes
Top average wealth-tax rates	No	No	Yes	Yes	Yes	Yes
Top average income-tax rates	No	No	No	Yes	Yes	Yes
Inheritance-tax rates	No	No	No	No	Yes	Yes
Share of foreigners	No	No	No	No	No	Yes

Note: This Table shows the estimation result of the model presented in Equation (3). Panel A uses the number of foreign-born super-rich in our BILANZ data set as the dependent variable. More detailed results for this sub-sample, including estimation coefficients on the control variables, are presented in Table B9 in the appendix. Analogously, Panel B employs the number of Swiss-born super-rich. Again, for more detailed results, see the Table B10 in the Appendix. Panel C utilizes the full sample of super-rich. Panel D employs an alternative sample, namely the number of rich taxpayers (i.e., taxpayers with net wealth greater than 10m CHF). The number of observations drops from model (2) to (3) because population-weighted tax controls are only available for the period 1999-2018. In columns (2) to (6), we control for pre-trends using de-trended residuals as outcome variable (see text for details). Standard errors allow for three-way clustering (canton-pair, origin-year, destination-year) and are shown in parentheses beneath the estimates. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

4.4 Backing out the Implied Mobility Elasticity

So far, we have shown that the abolition of the expenditure-based taxation has led to a drop in the stock of super-rich foreigners of around 43%. In this section, we perform a back-of-the-envelope calculation to obtain the implied mobility elasticity. A limitation of the Swiss setting is that the stipulated tax rates themselves did not change. What differs between regular taxation and expenditure-based taxation is the definition of the tax *base*. Unfortunately, we do not know the difference between the synthetic expenditure tax base and the true income and wealth tax base of the eligible taxpayers.[20] What follows is therefore an approximation of the effective tax rates under expenditure-based and regular taxation of super-rich foreigners.

We define the mobility elasticity, $\eta^{FB}_{1-\tau}$, as the percentage change in the number of foreign-born super-rich divided by the relative change in the total net-of-tax rate on wealth resulting from the abolition of expenditure-based taxation. Using our estimate from (1), we can write:

$$\eta^{FB}_{1-\tau} = \frac{e^{(\beta^{DD})} - 1}{[(1-\tau^{ord})/(1-\tau^{exp}) - 1]}. \tag{4}$$

According to our preferred estimates, the percentage change in the number of foreign-born super-rich is -43% ($\beta^{DD} = -0.56$). Since expenditure-based taxation results in a reduced base instead of an explicitly reduced rate, and because we do not observe actual tax burdens, we need to rely on a series of simplifying assumptions to come up with estimates of τ^{ord} and τ^{exp}.

Let $\tau^{\text{exp}} = T^{\text{exp}}/W$ denote the effective wealth tax rate faced by a super-rich subject to expenditure-based taxation, where τ^{exp} is just the ratio of the total tax bill T^{exp} to actual net wealth W.[21] Similarly, we define $\tau^{\text{ord}} = T^{\text{ord}}/W$ as the effective wealth tax rate under ordinary taxation. Here, the total tax bill T^{ord} is given by $T^{\text{ord}} = W \cdot \tau^{w} + W \cdot r \cdot \tau^{\text{inc}}$, where $W \cdot \tau^{w}$ is the wealth tax burden. r is the average return on net wealth, such that $W \cdot r \cdot \tau^{\text{inc}}$ denotes the tax burden on income.[22]

[20] Despite our many efforts, we have unfortunately been unable to obtain either micro-level administrative data on (former) expenditure-based taxpayers or, alternatively, aggregate statistics on the number of (former) expenditure-based taxpayers who remained in or moved out of a canton, respectively, along with their average income, wealth, and tax burden.

[21] Expenditure-based taxpayers actually pay both income and wealth taxes, but for simplicity we express their total tax burden relative to their overall net wealth using τ^{exp}.

[22] We abstract from labor income given that for the super-rich labor income is negligible (and besides, expenditure-based taxpayers are not allowed to have labor income within Switzerland). Furthermore, Switzerland does not have a separate tax rate for capital and labor income.

Table 3: Implied Tax Mobility Elasticities – An Approximation

		Foreign-born Super-rich Type		
		Min	Avg	Max
Net wealth (in m. CHF)		150.0	1,975.0	35,500.0
Capital income (in m. CHF)		3.0	39.5	710.0
Ordinary Taxation Canton Zurich				
τ^{ord}		1.42%	1.44%	1.44%
Expenditure-Based Taxation				
T^{exp}_{mean} (in CHF)	115,531			
T^{exp}_{max} (in CHF)	9,585,380			
T^{exp}_{max2008} (in CHF)	23,210,876			
Scenario A: τ^{exp}_{mean}		0.0770%	0.0058%	0.0003%
Scenario B: τ^{exp}_{max}		[*6.39%*]	0.49%	0.03%
Scenario C: $\tau^{exp}_{\text{max2008}}$		[*15.47%*]	1.18%	0.07%

Implied Tax Mobility Elasticities for Stock of Super-Rich

	Scenario A: Mean Tax (T^{exp}_{mean})		
Change in net of tax rate $[(1-\tau^{ord})/(1-\tau^{exp}_{\text{mean}})-1]$	-1.34%	-1.44%	-1.44%
Wealth tax elasticity $\eta^{FB}_{1-\tau}$	31.98	29.91	29.77
Income tax elasticity $\eta^{FB}_{\text{1-t}}$	1.36	1.28	1.27
	Scenario B: Max Tax (T^{exp}_{max})		
Change in net of tax rate $[(1-\tau^{ord})/(1-\tau^{exp}_{\text{max}})-1]$	[*5.31%*]	-0.93%	-1.39%
Wealth tax elasticity $\eta^{FB}_{1-\tau}$	[*-8.10*]	46.24	30.94
Income tax elasticity $\eta^{FB}_{\text{1-t}}$	[...]	1.97	1.32
	Scenario C: Max Tax 2008 (T^{exp}_{max2008})		
Change in net of tax rate $[(1-\tau^{ord})/(1-\tau^{exp}_{\text{max2008}})-1]$	[*16.63%*]	-0.27%	-1.38%
Wealth tax elasticity $\eta^{FB}_{1-\tau}$	[*-2.59*]	158.35	31.15
Income tax elasticity $\eta^{FB}_{\text{1-t}}$	[...]	6.75	1.33

Note: This table illustrates the sensitivity of the location choice of the foreign-born super-rich to the abolition of expenditure-based taxation in Switzerland by estimating and indicating the implied mobility elasticity under different plausible scenarios. Specifically, we consider three model types of super-rich from our rich list dataset: the poorest (min.), average (avg.) and richest (max.) foreign-born, as listed in the columns. Furthermore, for each of these three types of super-rich, we again consider three different scenarios: they could be paying a) the average expenditure-based tax, T^{exp}_{mean}; b) the typical maximum expenditure-based tax, T^{exp}_{max}; and c) the maximum expenditure-based tax paid in 2008, T^{exp}_{max2008}, which was a particularly high outlier (see text for details). Values highlighted in italics and in brackets are unrealistic for the specific case—particularly the poorest (min.) super-rich will not have paid the highest expenditure-based tax bill (T^{exp}_{max} or T^{exp}_{max2008}).

We use the example of the Canton of Zurich in 2008 (i.e., the year before the vote on

the abolition of expenditure-based taxation) to provide plausible values of the different tax rates for three model-types of super-rich taxpayers from our rich list data set: the poorest (Min.), average (Avg.), and richest (Max.) foreign-born super-rich in our data set. Row 1 of Table 3 shows their net wealth in 2008. We assume that their capital income (excluding tax-free capital gains) amounts to 2% of their net wealth (i.e., $r = 0.02$).[23] To determine the total ordinary tax rate on wealth, τ^{ord}, for the three types of super-rich, we employ the tax calculator of the Federal Tax Administration (FTA).[24] The corresponding tax rates under ordinary taxation are reported in Table 3.

To obtain an estimate of the effective total tax rate on wealth under expenditure-based taxation, $\tau^{\text{exp}} = T^{\text{exp}}/W$, we rely on statistics for T^{exp} published by the Conference of Cantonal Directors of Finance[25]. The effective tax burden can be quite independent of true income and wealth, which is why we work with three different scenarios: each of the three types of super-rich could be paying a) the average expenditure-based tax, T^{exp}_{mean}; b) the typical maximum expenditure-based tax, T^{exp}_{max}; and c) the maximum expenditure-based tax paid in 2008, T^{exp}_{max2008}, which was a particularly high outlier. We report these amounts in Table 3 and divide them by the respective total net wealth of each of our three super-rich sample cases to obtain their hypothetical tax rates under expenditure based taxation, τ^{exp}. In line with how the expenditure-based tax is designed, effective tax rates are decreasing in wealth. However, note that scenarios b) and c) are most unlikely to apply to super-rich of type Min, as they would imply higher tax rates than under ordinary taxation. We therefore report these scenarios in squared brackets.

This finally allows us to estimate $\eta^{FB}_{1-\tau}$ using Equation 4 for the three types of foreign-born super-rich under three scenarios T^{exp}_{mean} (Scenario A), T^{exp}_{max} (Scenario B), and T^{exp}_{max2008} (Scenario C), shown in the lower half of Table 3. Our causal estimate of -43% for the drop in the stock of super-rich taxpayers implies a substantial elasticity of the stock of super-rich taxpayers w.r.t. the total net-of-tax rate on wealth. Across the three types and most realistic scenarios, the estimates range between 29.77 and 31.98.[26]

Previous work has estimated mobility elasticities w.r.t. the net-of-tax rate on (capital) income. To allow for a better comparison with previous estimates, we follow Kopczuk (2019), Brülhart et al. (2022), and Agrawal et al. (2023), and convert our estimate of $\eta^{FB}_{1-\tau}$ into an equivalent mobility elasticity w.r.t. the net-of-income-tax rate $\eta^{FB}_{1-\lambda}$ using the

[23] This return may seem rather low. However, Baselgia (2024) provides evidence that returns on financial assets (excluding untaxed realized capital gains) are between 1.5% and 2% at the top end of the distribution (see Figure B11 in Appendix B.3 in Baselgia, 2024). In our context, a rather low rate of return takes into account that the super-rich typically have legal ways to reduce their income tax burden in particular by sheltering part of their income in a holding company and by benefiting from privileged dividend taxation.

[24] The FTA tax calculator is available online: https://swisstaxcalculator.estv.admin.ch/. We specified τ^{w} and τ^{inc} for a single taxpayer without children of Protestant faith in the city of Zurich in 2010 (the first year for which the tax calculator is available, however, there were no tax changes between 2008 and 2010).

[25] The evaluation of the Conference of Cantonal Finance Directors is available at https://www.fdk-cdf.ch/-/media/FDK_CDF/Dokumente/Themen/Steuerpolitik/Aufwandbesteuerung/190607_AufwBest_MM_FDK_DEF_F.pdf?rev=2d0ac274e6df497ca691d0ef21a2ed74 (only available in German).

[26] It seems unlikely that the average super-rich would pay the typical maximum expenditure-based tax or even the exceptionally high expenditure-based tax that was paid by someone in 2008.

equation:

$$\eta^{FB}_{1-\lambda} = \eta^{FB}_{1-\tau} \cdot \frac{d\ln(1-\tau)}{d\ln(1-\lambda)} \tag{5}$$

λ is the revenue-equivalent capital income tax rate to a wealth tax rate τ. It is determined by:

$$\lambda = \frac{(1+\rho)}{\rho} \cdot \tau, \tag{6}$$

with ρ denoting the rate of return on wealth (including capital gains). We assume $\rho = 5\%$, in which case a 1% wealth tax rate results in a revenue-equivalent capital income tax rate of $21\% = \frac{1.05}{0.05} \cdot 1\%$. Our lower-bound estimate for $\eta^{FB}_{1-\tau} = 29.77$ then implies a mobility elasticity w.r.t. the capital income net-of-tax rate of 1.27. In Table 3 we further report mobility elasticities w.r.t. income taxes for other types and other scenarios. All estimates imply an elasticity of 1.27–1.36 well in line with other studies—except for the most unlikely case where the average super-rich expenditure-based taxpayer would find herself in Scenario C, paying an exceptionally high expenditure-based tax.

As discussed in the introduction, the 35% drop in super-rich Forbes 400 individuals in US states that still apply estate taxes reported in Moretti and Wilson (2023) are not directly comparable to the 43% reduction in our setting. Indeed, the underlying elasticities are very different. The implied migration elasticity for the per capita number of Forbes billionaires w.r.t. wealth taxation in their study is only 0.60.[27]

In contrast, work by Advani et al. (2023) suggests that less than 5% of previous "non-dom" taxpayers left the UK after their eligibility for the scheme was lifted. Unfortunately, they focus on the outflow in the first year after the reform, and do not report estimates on the medium run change in stocks, which would also include the inflow into the country. This is important for tax policy: not attracting new super-rich taxpayers has dynamic implications for the tax base as our results show, even if the outflow of super-rich is small. As we show in Appendix Table B8, super-rich foreigners newly entering our rich-list data are significantly less likely to reside in cantons that repealed the policy than in those that still offer it. Furthermore, the "non-dom" tax scheme is available to UK citizens and to individuals who earn labor income within the UK, and the 2017 reform Advani et al. (2023) study removed access for those who had been in the UK for at least 15 of the last 20 years or those born in the UK to a UK father. These individuals are much more attached to the UK than foreigners without Swiss labor income to Switzerland.

5 Conclusion

The high share of foreigners at the very top of the Swiss wealth distribution can likely be explained by the preferential tax treatment Switzerland offers to super-rich foreigners

[27] It remains unclear how directly comparable these elasticity estimates are, as Moretti and Wilson (2023) estimate migration effects w.r.t. the estate tax. They then transform their estate tax elasticity using estimates of mortality rates (for a 75-year-old male in the top 1 percent of the income distribution) into a corresponding wealth tax elasticity (see p. 447 in Moretti and Wilson (2023) for details).

eligible for expenditure-based taxation. While we cannot quantify the pull effect of this policy at the international level, we provide first-time evidence of how sensitive super-rich foreigners are to this policy when it comes to their choice where to reside within Switzerland. We exploit the abolition of expenditure-based taxation in some cantons, using two alternative identification strategies. Both approaches suggest that location choices of the super-rich are sensitive to taxation: the abolition of these preferential tax treatments reduces the stock of super-rich in a canton by approximately 40-45%.

The novel rich list data we use limits the statistical power for the analysis of the mechanisms. Yet descriptive evidence suggests that while some super-rich are indeed pushed out and move to other cantons, another part of the effect comes from new arrivals who chose to move to those cantons still offering the preferential tax regime.

Back-of-the-envelope estimations suggest that the implied elasticity of the stock of super-rich taxpayers w.r.t. the total net-of-tax rate on wealth ranges between 29.8 and 32.0. The more commonly reported equivalent elasticity w.r.t. the net-of-income-tax rate lies between 1.3 and 1.4. While they seem plausible, we want to highlight that these elasticities remain very much approximative. This is due to the lack of access to tax data, which would not only contain the full universe of expenditure-based taxpayers (that still amounts to over 4,500 after the cantonal repeals), but would give insights into the difference in effective tax rates under regular vs. expenditure-based taxation. Therefore, one of the policy conclusions we draw from this paper is that micro-level tax data would promote evidence-based policy making. This is particularly important in a country where citizens regularly vote on specific policies, including tax policies. We hope that our paper serves as an impetus for better data access to study this and other topics more thoroughly in the future, including the revenue effects of such tax changes.

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Online Appendix

Mobility Responses to Special Tax Regimes for the Super-Rich:
Evidence from Switzerland

Enea Baselgia Isabel Z. Martínez

April 23, 2024

A Data Appendix

The regression results presented in Section 4 include in their full specification the five time-varying canton controls below. Thereby, all control variables (in the corresponding columns (iii) to (vi) in the tables) are introduced in logarithmic form. In the empirical specification presented in Table 2 the four time-varying canton-pair controls are included in the vector $X_{do,t}$ as log ratios or log differentials for each of the canton pairs. For example in the case of column (iii) as $[(\ln(1-\tau^w_{d,t}) - \ln(1-\tau^w_{o,t})]$, which is the log net-of-wealth-tax rate differential between each canton pair.

(iii) Top average wealth-tax rates. This variable contains the average personal wealth tax rate (i.e., including cantonal, municipality and parish taxes) by canton for a married taxpayer without children with gross wealth of 10m CHF.[28] Cantonal average wealth tax rates are aggregated from all Swiss municipalities for the period 1999-2020. For the years 2009-2020 these data are available directly from the Federal Tax Administration (FTA).[29] Parchet (2019) has computed consolidated tax rates at municipal level for all municipalities in Switzerland between 1983 and 2012.[30] We are very grateful to Raphaël Parchet (2019) for providing us with his data (for the period 1998-2014). This enables us to construct top average wealth tax rates for all Swiss municipalities for the entire period from 1999-2020. The top average wealth tax rates at the cantonal level are constructed by weighting the tax rates by the number of taxpayers in each municipality.[31]

(iv) Top average income-tax rates. This variable contains the average personal income tax rate (i.e., including cantonal, municipality and parish taxes) by canton for a married taxpayer without children with annual gross income of 1m CHF. This variable is constructed analogously to the above and also builds on data compiled by Parchet (2019).

[28] For the canton of Basel-Stadt, we had to rely on the wealth tax rate on gross wealth of 5m CHF due to data limitations. However, since we exploit variation over time, this should not be an issue.
[29] Available from the FTA: https://www.estv.admin.ch/estv/en/home/fta/tax-statistics.html
[30] Details on the construction of these tax rates can be found in the online appendix of his paper.
[31] Available from the FTA: https://www.estv.admin.ch/estv/en/home/fta/tax-statistics.html

(v) Inheritance tax rates. To control for cantonal differences in inheritance taxes, column (5) includes two different tax rates for the entire 1999-2020 period. The first tax rate reflects the percentage of tax due on an inheritance of 0.5m CHF received by direct descendants. The second tax rate analogously includes the percentage in the case of an inheritance of 0.5m CHF to an unrelated person. Both tax rates refer to the tax burden at the cantonal capital. We have gathered these data from the annual publication "Steuerbelastung in den Kantonshauptorten".[32]

(vi) Share of foreigners. We use the share of foreigners in the total population as a control/proxy for internationalization.[33]

Wealth tax statistics. The sample in Panel D of our regressions in Tables 1 and 2 comes from the official wealth tax statistics published on the website of the FTA.[34]

[32] Available from the FTA: https://www.estv.admin.ch/estv/en/home/fta/tax-statistics.html
[33] Available from the Federal Statistical Office: https://www.bfs.admin.ch/bfs/en/home/statistics/population.html
[34] Available from the FTA: https://www.estv.admin.ch/estv/en/home/fta/tax-statistics.html

B Additional Tables and Figures

B.1 Additional Tables

Table B2: Popular Votes on Expenditure-Based Taxation

Canton	Vote	Date	Repealed	Percent in Favor	Statutory Removal	Remarks
Zürich	Yes	08.02.2009	Yes	52.9	01.01. 2010	
Schaffhausen	Yes	25.09.2011	Yes	55.1	01.01. 2012	
Apenzell A.Rh.	Yes	11.03.2012	Yes	61.1	01.01. 2012	
Basel-Stadt	Yes	19.09.2012	Yes	*	01.01. 2014	Repealed by cantonal parliament vote (56 Y / 16 N / 4 abstentions).
Basel-Landschaft	Yes	23.09.2012	Yes	61.5	01.01. 2014	
Glarus	Yes	01.05.2011	No	< 50		Actual percentage of yes-votes is unknown, as in Glarus voting is done by show of hands.
Thurgau	Yes	15.05.2011	No	47.0		A counter-proposal to tighten the conditions for expenditure-based taxation was accepted (61%).
St. Gallen	Yes	27.11.2011	No	51.9		In the run-off question, the counter-proposal won by 64,681 to 54,987 votes against the initiative.
Luzern	Yes	11.03.2012	No	48.0		A counter-proposal to tighten the conditions for expenditure-based taxation was accepted (52%).
Bern	Yes	23.09.2012	No	33.5		A counter-proposal to tighten the conditions for expenditure-based taxation was accepted (53%).
Nidwalden	Yes	03.03.2013	No	31.4		
Geneve	Yes	30.11.2014	No	31.6		
Uri	No					
Schwyz	No					
Obwalden	No					
Zug	No					
Fribourg	No					
Solothurn	No					
Apenzell I.Rh.	No					
Graubünden	No					
Aargau	No					
Ticino	No					
Vaud	No					
Valais	No					
Neuchatel	No					
Jura	No					
Federation	Yes	30.11.2014	No	40.8		Expenditure-based taxation would have been forbidden at once in the entire country by constitutional law. The overall participation rate in the federal vote was 49.2%.

Note: This table shows in which cantons a vote on the abolition of the expenditure-based taxation took place. Column 5 presents the percentage of votes in favor of abolishing expenditure-based taxation in the cantonal popular votes. Column 7 contains remarks. The information displayed in the table is taken from cantonal websites or in some cases was provided via email by cantonal authorities.

Table B1: Tightened Expenditure-Based Taxation: Minimum Tax Bases

Canton	Since year	Income (in 1'000 CHF)	Wealth
Federation	2016	400	no wealth tax
Zürich	2010	*repealed*	*repealed*
Bern	2013	400	only real estate held in the canton
Luzern	2013	600	min. 20 x taxable income
Uri	2016	400	min. 20 x taxable income
Schwyz	2015	600	min. 20 x taxable income
Obwalden	2016	400	min. 10 x taxable income
Nidwalden	2014	400	min. 20 x taxable income
Glarus	2016	400	min. 20 x taxable income
Zug	2016	500	min. 20 x taxable income
Fribourg	2014	250	min. 4 x taxable income
Solothurn	2016	400	min. 20 x taxable income
Basel-Stadt	2014	*repealed*	*repealed*
Basel-Landschaft	2014	*repealed*	*repealed*
Schaffhausen	2012	*repealed*	*repealed*
Appenzell A.Rh.	2012	*repealed*	*repealed*
Appenzell I.Rh.	2015	400	min. 20 x taxable income
St. Gallen	2012	600	min. 20 x taxable income
Graubünden	2016	400	none
Aargau	2016	400	min. 20 x taxable income
Thurgau	2012	**	**
Ticino	2016	400	min. 5 x taxable income
Vaud	2016	415	15% of income tax liability
Valais	2016	250	min. 4 x taxable income
Neuchâtel	2016	400	min. 5 x taxable income
Genève	2016	400	10% top-up of income tax base
Jura	2016	200	min. 8 x taxable income

Note: Overview of the minimum requirements for expenditure-based taxation and the year they were put in place (including the year expenditure-based was repelled). These rules have remained unchanged throughout 2020 and beyond.

The income tax base is defined as the *largest* of the following sums:
a) global annual expenditures, incl. social security contributions of approx. 25,000 CHF per adult
b) seven times the annual rent or rental value of the home / three times the annual hotel expenditures
c) sum of gross capital incomes (including from IP) earned in Switzerland and pensions from a Swiss source plus incomes earned abroad for which the taxpayer claims full or partial relief from foreign taxes
d) the minimum income tax bases listed in the table.

Typically, the wealth tax base is a multiple of the income tax base, but must be at least as large as the assets and real estate held in Switzerland. Exceptions are i) Bern, where only real estate held in the canton is subject to the wealth tax; ii) Graub√ºnden, where no minimum is defined; iii) Vaud, where the wealth tax is simply 15% of the income tax liability (i.e., no wealth tax is calculated); iv) Geneva, where the wealth tax liability shall be accounted for by inflating the income tax base by 10%; v) ** Thurgau, where the law demands that the minim total amount in taxes paid is 150,000 CHF per year. In Thurgau, provision b) is further defined as ten times the rental value / four times the hotel expenditures.

Prior to these changes, only provisions a) and c) applied, and the law was not explicit about whether expenditures were defined globally or included expenses in Switzerland only. Most cantons adjusted the rules in 2016, when requirements in the Federal Income Tax Law were tightened. Those cantons that changed earlier, typically did so in response to unsuccessful popular initiatives demanding the repeal of expenditure-based taxation (see Table B2).

The Federal Law on Expenditure-based Taxation can be found here: https://www.admin.ch/opc/de/official-compilation/2013/779.pdf. For additional explanations see: https://www.efd.admin.ch/efd/en/home/steuern/steuern-national/lump-sum-taxation.html. The information on cantonal laws was retrieved from cantonal websites or in some cases was provided via email by cantonal authorities.

Table B3: Detailed DD Estimation Results for the Foreign-Born Super-Rich

Panel A:	**Foreign-Born Super-Rich, 1999-2020**					
Model	(1)	(2)	(3)	(4)	(5)	(6)
β^{DD}	−0.31***	−0.58***	−0.57***	−0.57***	−0.55***	−0.56***
	(0.10)	(0.11)	(0.11)	(0.11)	(0.12)	(0.11)
ln top average net-of-wealth-tax rate			13.74	−2.81	−10.86	−28.21
			(79.24)	(84.6)	(80.77)	(73.66)
ln top average net-of-income-tax rate				1.46	2.17	2.80
				(3.87)	(3.98)	(3.94)
ln net-of-inheritance-tax rate (unrelated individual)					−0.01	−0.08
					(0.88)	(0.86)
ln net-of-inheritance-tax rate (direct descendants)					−1.82	−1.31
					(3.59)	(3.37)
ln share of foreigners						1.01
						(0.71)
No. of obs.	411	411	411	411	411	411
Controls	(1)	(2)	(3)	(4)	(5)	(6)
Canton fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Canton-treatment linear trend	No	Yes	Yes	Yes	Yes	Yes

Note: This table shows the detailed estimation results for the sample of foreign-born super-rich (Panel A) shown in condensed form in Table 1. Analogously, Table B4 presents the detailed estimation results for the Swiss-born super-rich (Panel B). In columns (2) to (6), we control for pre-trends using de-trended residuals as outcome variable (see text for details). Standard errors are clustered by canton and are shown in parentheses, below the coefficients. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table B4: Detailed DD Estimation Results for the Swiss-Born Super-Rich

Panel B:	**Swiss-Born Super-Rich, 1999-2020**					
Model	(1)	(2)	(3)	(4)	(5)	(6)
β^{DD}	−0.27***	0.12	0.14	0.12	0.01	0.02
	(0.08)	(0.07)	(0.08)	(0.08)	(0.07)	(0.07)
ln top average net-of-wealth-tax rate			26.31	13.57	−1.08	35.22
			(58.94)	(72.94)	(71.07)	(75.26)
ln top average net-of-income-tax rate				0.96	1.05	0.71
				(3.14)	(3.17)	(3.19)
ln net-of-inheritance-tax rate (unrelated individual)					0.41	0.22
					(0.30)	(0.30)
ln net-of-inheritance-tax rate (direct descendants)					−2.62	−2.24
					(2.79)	(2.52)
ln share of foreigners						−1.19**
						(0.55)
No. of obs.	466	466	466	466	466	466
Controls	(1)	(2)	(3)	(4)	(5)	(6)
Canton fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Canton-treatment linear trend	No	Yes	Yes	Yes	Yes	Yes

Note: This table shows the detailed estimation results for the sample of Swiss-born super-rich (Panel B) shown in condensed form in Table 1. Analogously, Table B3 presents the detailed estimation results for the foreign-born super-rich (Panel A). In columns (2) to (6), we control for pre-trends using de-trended residuals as outcome variable (see text for details). Standard errors are clustered by canton and are shown in parentheses, below the coefficients. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table B5: DD Results for the Foreign-Born Super-Rich without the Canton-Treatment Linear Trend

Panel A:	**Foreign-Born Super-Rich, 1999-2020**					
Model	(1)	(2)	(3)	(4)	(5)	(6)
β^{DD}	−0.31***	**-0.58*** **	−0.30**	−0.30**	−0.31**	−0.31***
	(0.10)	**(0.11)**	(0.11)	(0.11)	(0.11)	(0.11)
ln top average net-of-wealth-tax rate			14.62	−8.53	−9.86	−18.04
			(79.44)	(83.55)	(79.27)	(70.95)
ln top average net-of-income-tax rate				2.04	2.08	2.29
				(3.76)	(3.89)	(3.83)
ln net-of-inheritance-tax rate (unrelated individual)					0.16	0.17
					(0.93)	(0.92)
ln net-of-inheritance-tax rate (direct descendants)					−0.36	0.00
					(3.76)	(3.46)
ln share of foreigners						0.50
						(0.71)
No. of obs.	411	411	411	411	411	411
Controls	(1)	(2)	(3)	(4)	(5)	(6)
Canton fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Canton-treatment linear trend	No	**Yes**	No	No	No	No

Note: This table shows detailed estimation results for the sample of foreign-born super-rich (Panel A) *without* the inclusion of a canton-treatment linear trend. Standard errors are clustered by canton and are shown in parentheses, below the coefficients. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table B6: Robustness: DD-Estimation with Poisson Pseudo-Maximum Likelihood (PPML) (I/II)

Model	(1)	(2)	(3)	(4)	(5)
	Panel A: Foreign-Born Super-Rich, 1999-2020				
	unrestricted sample				
β^{DD}	−0.26**	−0.21*	−0.21*	−0.24**	−0.24**
	(0.12)	(0.12)	(0.12)	(0.11)	(0.11)
No. of obs.	484	484	484	484	484
	restricted sample				
β^{DD}	−0.23**	−0.17*	−0.17*	−0.20**	−0.20**
	(0.10)	(0.10)	(0.10)	(0.10)	(0.09)
No. of obs.	411	411	411	411	411
	Panel B: Swiss-Born Super-Rich, 1999-2020				
	unrestricted sample				
β^{DD}	−0.17*	−0.05	−0.05	−0.07	−0.07
	(0.09)	(0.09)	(0.08)	(0.08)	(0.07)
No. of obs.	550	550	550	550	550
	restricted sample				
β^{DD}	−0.16*	−0.05	−0.04	−0.06	−0.06
	(0.09)	(0.08)	(0.07)	(0.07)	(0.06)
No. of obs.	466	466	466	466	466
Controls	(1)	(2)	(3)	(4)	(5)
Canton Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Top average wealth-tax rates	No	Yes	Yes	Yes	Yes
Top average income-tax rates	No	No	Yes	Yes	Yes
Inheritance-tax rates	No	No	No	Yes	Yes
Share of foreigners	No	No	No	No	Yes

Table B6: Robustness: DD-Estimation with Poisson Pseudo-Maximum Likelihood (PPML) (II/II)

Model	(1)	(2)	(3)	(4)	(5)
	Panel C: All Super-Rich, 1999-2020				
	unrestricted sample				
β^{DD}	−0.19**	−0.12	−0.12	−0.14*	−0.14**
	(0.09)	(0.09)	(0.08)	(0.08)	(0.07)
No. of obs.	550	550	550	550	550
	restricted sample				
β^{DD}	−0.20**	−0.13	−0.13	−0.15*	−0.16**
	(0.09)	(0.09)	(0.08)	(0.08)	(0.07)
No. of obs.	506	506	506	506	506
	Panel D: Rich Taxpayers, 2003-2020				
β^{DD}	−0.37***	−0.34***	−0.34***	−0.34***	−0.34***
	(0.05)	(0.06)	(0.05)	(0.05)	(0.05)
No. of obs.	468	468	468	468	468
Controls	(1)	(2)	(3)	(4)	(5)
Canton Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Top average wealth-tax rates	No	Yes	Yes	Yes	Yes
Top average income-tax rates	No	No	Yes	Yes	Yes
Inheritance-tax rates	No	No	No	Yes	Yes
Share of foreigners	No	No	No	No	Yes

Note: This table shows the estimation results of the model presented in Equation (1) using PPML. Panel A uses the number of foreign-born super-rich in our BILANZ data set as the dependent variable. Panel B employs the number of Swiss-born super-rich. Panel C utilizes the full sample of super-rich. Panel D uses the number of rich taxpayers (i.e., taxpayers with net wealth greater than 10m CHF). For Panels A to C we show the estimation results from both an unrestricted and a restricted sample. The unrestricted sample incorporates zeros in the dependent variable as part of the PPML estimation and thus utilizes all observations. However, the PPML estimator by Correia et al. (2020) (see ppmlhdfe) that we employ omits singletons to obtain a valid inference, which is why even for the unrestricted sample the number of observations is always slightly less than the product of years times cantons (e.g. in Panel C: $550 < 572 = 22 \times 26$). The restricted sample, on the other hand, excludes all observations with zeros in the dependent variable. Consequently, the same observations are used as in the OLS estimation presented in Table 1 (note that the number of observations is identical). Panel D only includes strictly positive values, so that the number of observations is identical by design. Standard errors are clustered by canton and are shown in parentheses, below the coefficients. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Takeaway of the robustness exercise: PPML estimation results are highly similar regardless of whether they are based on the *unrestricted* sample (which contains zeros) or the *restricted* sample (our OLS sample). Of particular note is that for the foreign-born super-rich (Panel A), who is our main group of interest, the effect in the restricted sample tends to be smaller than in the unrestricted sample, suggesting that our OLS results reported in Table 1 likely represent a lower rather than an upper bound of the true effect.

Table B7: Mobility of the Super-Rich – Whereabouts 5 Years after Treatment

					Exit reason				
		Stayed	**Left**	**Exit**	1)	2)	3)	4)	5)
Canton		*Panel A: Foreign-born*							
Treatment	N	6	4	9	2	5	1	0	1
	in %	*32*	*21*	*47*	*11*	*26*	*5*	*0*	*5*
	Expected N	12	2	6					
Control	N	73	9	45	12	6	2	7	18
	in %	*57*	*7*	*35*	*9*	*5*	*2*	*6*	*14*
	Expected N	79	10	38					
		Panel B: Swiss-born							
Treatment	N	43	3	9	1	2	0	1	5
	in %	*78*	*5*	*16*	*2*	*4*	*0*	*2*	*9*
	Expected N	34	4	17					
Control	N	57	6	23	10	5	1	0	7
	in %	*66*	*7*	*27*	*12*	*6*	*1*	*0*	*8*
	Expected N	54	7	26					
χ^2	17.5731								
p-value	0.007								

Note: This table shows where foreign-born and Swiss-born super-rich individuals from a treated or non-treated canton lived five years after the abolition in their canton of residence (treatment group), or five years after abolition in the canton of Zurich, i.e., in 2015, (control group). The super-rich either (i) stayed, (ii) left for another canton, or (iii) exited the panel. The last four columns indicate the reason why a super-rich observation exited our sample. 1) death or transfer of wealth to heirs before death, 2) wealth below cutoff to enter the rich list, 3) family observation aggregated or split up, 4) emigration, 5) unknown reason. N refers to the actual observation in our data. Expected N is the number of observations one would expect in each cell under statistical independence. Foreign-born individuals are twice as likely to move within Switzerland / half as likely to stay than what could be expected from the marginal distributions of the table. All foreigners are also more likely to exit the sample, while Swiss-born are less likely to exit the sample than expected under statistical independence. Swiss-born are also more likely to stay in their canton—especially if they live in a treatment canton. The Pearson χ^2 test statistic for the entire table reported at the bottom implies that the differences are statistically significant at the 1% level.

Table B8: Distribution of New Arrivals Across Treatment and Control Cantons

	Canton		
	Control	Treatment	**Total**
	Foreign-born		
N	75	13	88
Expected N	72	16	88
Row %	85.23	14.77	100.00
Col %	69.44	54.17	66.67
	Swiss-born		
N	33	11	44
Expected N	36	8	44
Row %	77.00	25.00	100.00
Col %	30.56	62.5	45.83
Total	108	24	132
Row %	81.82	18.18	100.00
Col %	100.00	100.00	100.00
χ^2	2.0625		
p-value	0.151		

Note: This table shows the distribution of new arrivals, i.e., those observations entering the rich list, across treatment and control cantons in the post-treatment periods. N refers to the actual observation in our data. Expected N is the number of observations one would expect in each cell under statistical independence. Foreign-born super-rich are less likely to move to a treatment canton, while Swiss-born are more likely to move to a treatment canton than what would be expected under statistical independence. The Pearson χ^2 test statistic reported at the bottom, however, implies that the differences are not statistically significant at conventional levels.

Table B9: Stock Ratio Estimation Across Canton Pairs

Panel A:	**Foreign-Born Super-Rich, 1999-2020**					
Model	(1)	(2)	(3)	(4)	(5)	(6)
β^{SR}	−0.34***	−0.56***	−0.56***	−0.57***	−0.54***	−0.53***
	(0.09)	(0.09)	(0.10)	(0.10)	(0.10)	(0.09)
ln top average net-of-wealth-tax rate			6.98	−17.18	−27.23	−39.08
			(32.53)	(34.30)	(34.98)	(34.00)
ln top average net-of-income-tax rate				1.94	2.93*	3.43**
				(1.63)	(1.73)	(1.72)
ln net-of-inheritance-tax rate (unrelated individual)					0.14	0.12
					(0.43)	(0.43)
ln net-of-inheritance-tax rate (direct descendants)					−2.43	−1.94
					(1.85)	(1.77)
ln share of foreigners						1.11***
						(0.36)
No. of obs.	3,671	3,671	3,671	3,671	3,671	3,671
No. of canton pairs	228	228	228	228	228	228
Controls	(1)	(2)	(3)	(4)	(5)	(6)
Destination Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Origin Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Canton-treatment linear trend	No	Yes	Yes	Yes	Yes	Yes

Note: This table shows the detailed estimation results for the sample of foreign-born super-rich (Panel A) shown in condensed form in Table 2. Analogously, Table B10 presents the detailed estimation results for the Swiss-born super-rich (Panel B). In columns (2) to (6), we control for pre-trends using de-trended residuals as outcome variable (see text for details). Standard errors allow for three-way clustering (canton-pair, origin-year, destination-year) and are shown in parentheses beneath the estimates. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table B10: Stock Ratio Estimation Across Canton Pairs

Panel B:	**Swiss-Born Super-Rich, 1999-2020**					
Model	(1)	(2)	(3)	(4)	(5)	(6)
β^{SR}	−0.30***	0.12***	0.13***	0.11***	0.00	0.00
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
ln top average net-of-wealth-tax rate			6.14	−19.43	−31.59	9.24
			(21.33)	(26.37)	(25.91)	(26.77)
ln top average net-of-income-tax rate				2.27*	2.18*	1.59
				(1.33)	(1.26)	(1.24)
ln net-of-inheritance-tax rate (unrelated individual)					0.36*	0.14
					(0.21)	(0.22)
ln net-of-inheritance-tax rate (direct descendants)					−2.23	−1.96
					(1.51)	(1.44)
ln share of foreigners						−1.43***
						(0.33)
No. of obs.	4,719	4,719	4,719	4,719	4,719	4,719
No. of canton pairs	296	296	296	296	296	296
Controls	(1)	(2)	(3)	(4)	(5)	(6)
Destination Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Origin Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Canton-treatment linear trend	No	Yes	Yes	Yes	Yes	Yes

Note: This table shows the detailed estimation results for the sample of Swiss-born super-rich (Panel B) shown in condensed form in Table 2. Analogously, Table B9 presents the detailed estimation results for the foreign-born super-rich (Panel A). In columns (2) to (6), we control for pre-trends using de-trended residuals as outcome variable (see text for details). Standard errors allow for three-way clustering (canton-pair, origin-year, destination-year) and are shown in parentheses beneath the estimates. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table B11: Robustness: Stock Ratio Estimation with a Fixed Sample

Model	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Foreign-Born Super-Rich, 1999-2020					
β^{SR}	−0.35***	−0.59***	−0.58***	−0.60***	−0.59***	−0.60***
	(0.09)	(0.09)	(0.10)	(0.10)	(0.10)	(0.10)
	Panel B: Swiss-Born Super-Rich, 1999-2020					
β^{SR}	−0.38***	0.13**	0.21***	0.17***	0.01	0.11*
	(0.07)	(0.05)	(0.05)	(0.05)	(0.06)	(0.06)
	Panel C: All Super-Rich, 1999-2020					
β^{SR}	−0.32***	−0.05	−0.02	−0.04	−0.09*	−0.07
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
No. of obs.	2,970	2,970	2,970	2,970	2,970	2,970
No. of canton pairs	204	204	204	204	204	204
Controls	(1)	(2)	(3)	(4)	(5)	(6)
Destination Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Origin Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Canton-treatment linear trend	No	Yes	Yes	Yes	Yes	Yes
Top average wealth-tax rates	No	No	Yes	Yes	Yes	Yes
Top average income-tax rates	No	No	No	Yes	Yes	Yes
Inheritance-tax rates	No	No	No	No	Yes	Yes
Share of foreigners	No	No	No	No	No	Yes

Note: This Table shows the estimation result of the model presented in Equation (3) for a restricted sample that includes at least one foreign-born and one Swiss-born super-rich person per canton. Panel A uses the number of foreign-born super-rich data set as the dependent variable. Analogously, Panel B employs the number of Swiss-born super-rich. Panel C utilizes the full sample of super-rich. In columns (2) to (6), we control for pre-trends using de-trended residuals as outcome variable (see text for details). Standard errors allow for three-way clustering (canton-pair, origin-year, destination-year) and are shown in parentheses beneath the estimates. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

B.2 Additional Figures

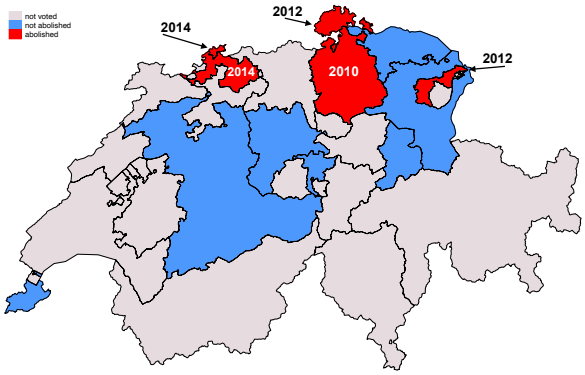
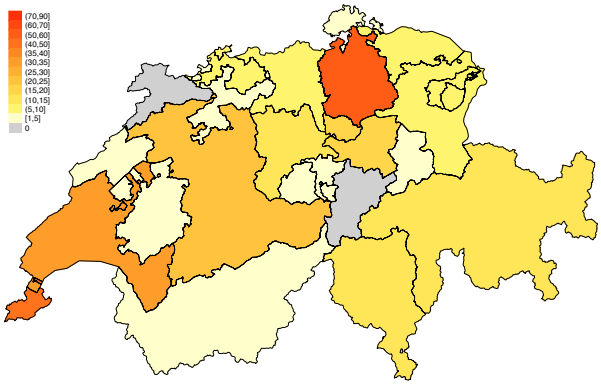
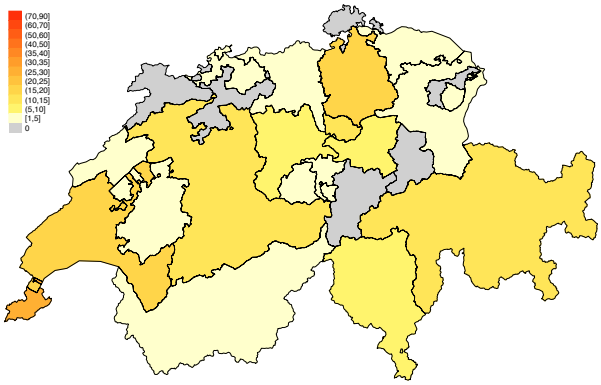


Figure B1: Map and Timing of the Abolition of Expenditure-Based Taxation

Note: The map shows in red the cantons that abolished the tax on expenses between 2010 and 2014. The years indicate the date of removal of expenditure-based taxation from the cantonal tax laws. Cantons in blue held a vote but did not abolish. For details on the cantonal reforms as well as the dates and results of the popular votes, see Table B2.



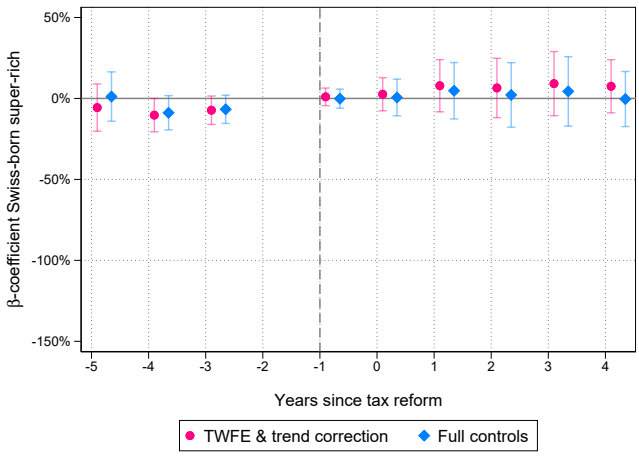
(a) All Super-rich in RL Sample



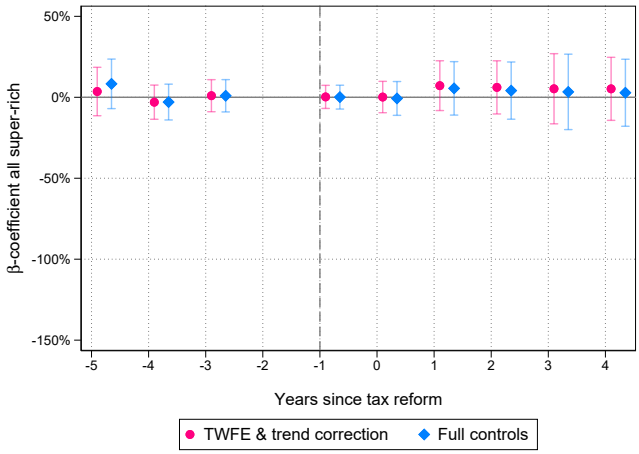
(b) Foreign-born Super-rich in RL Sample

Figure B2: Regional Distribution of the Super-rich, 2009

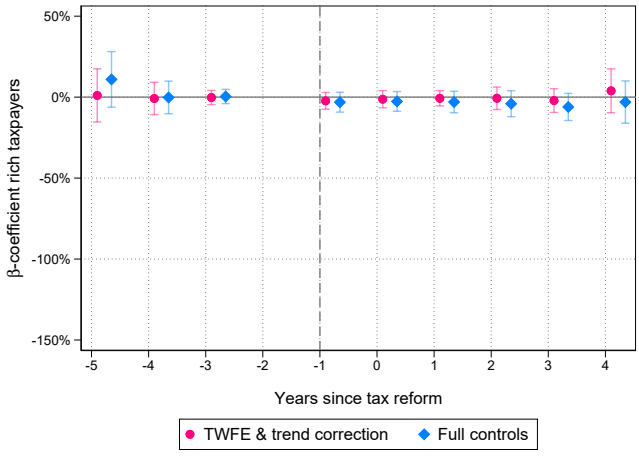
Note: Panel a) shows the number of all BILANZ rich list (RL) entries by canton of residence. Panel b) shows the number of foreign-born entries in our RL sample by canton of residence.



(a) Swiss-Born Super-Rich



(b) All Super-Rich



(c) Rich Taxpayers

Figure B3: Cumulative Event Study

Note: This figure shows the cumulative effects of removing expenditure-based taxation on the number of (super-)rich taxpayers in abolition cantons (see Equation 2). Estimates are relative to the second year prior to the abolition ($t = -2$), allowing for anticipation effects / early responses. We control for pre-trends using de-trended residuals as outcome variable (see text for details). The red circles correspond to a specification of Equation (2) which contains only year and canton fixed effects. The blue diamonds correspond to a specification that additionally contains the full vector of time-varying cantonal controls $X_{c,t}$. Point estimates are reported with their corresponding 95% confidence intervals, with standard errors clustered by canton.

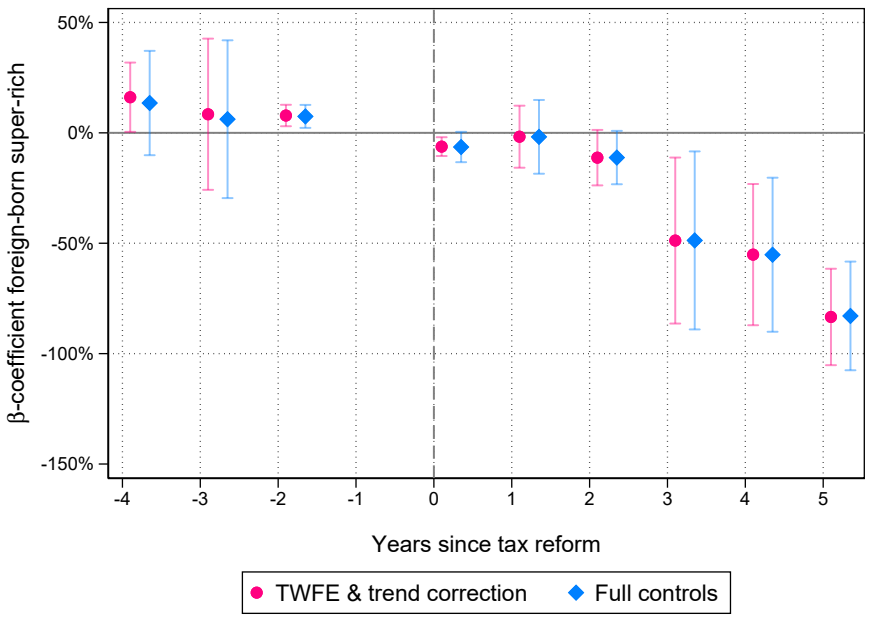
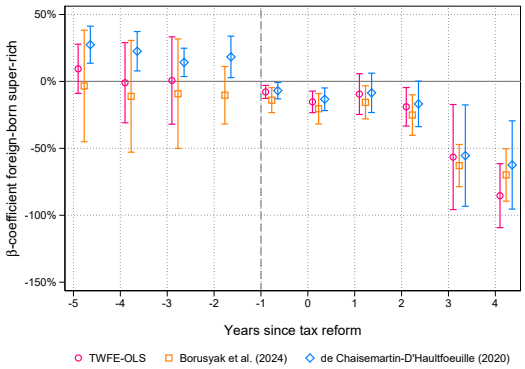
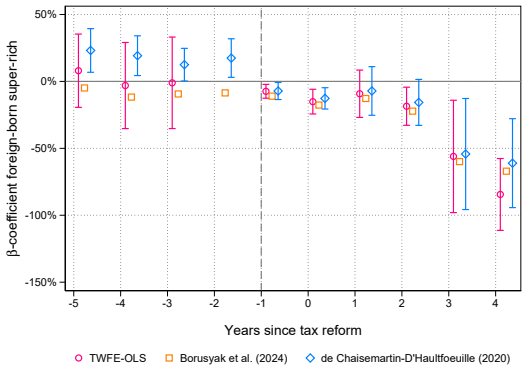


Figure B4: Cumulative Event Study without Anticipation Effects – Foreign-Born Super-Rich

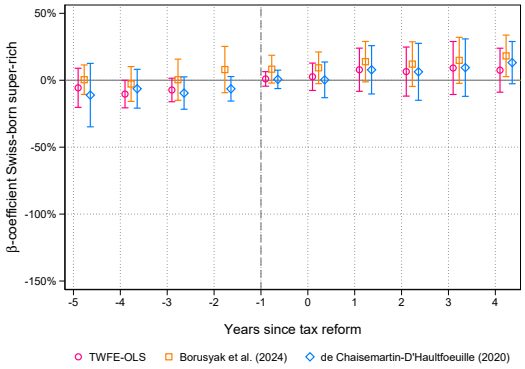
Note: This figure shows the cumulative effects of removing expenditure-based taxation on the number of foreign-born super-rich in abolition cantons (see Equation 2). Estimates are relative to the **first** year prior to abolition ($t = -1$), i.e. not considering anticipation effects / early reactions, as we do in our main specifications shown in Figure 2. We control for pre-trends using de-trended residuals as outcome variable (see text for details). The red circles correspond to a specification of Equation 2 which contains only year and canton fixed effects as well as the trend correction. The blue diamonds correspond to a specification that additionally contains the full vector of time-varying cantonal controls $X_{c,t}$. Point estimates are reported with their corresponding 95% confidence intervals, with standard errors clustered by canton.



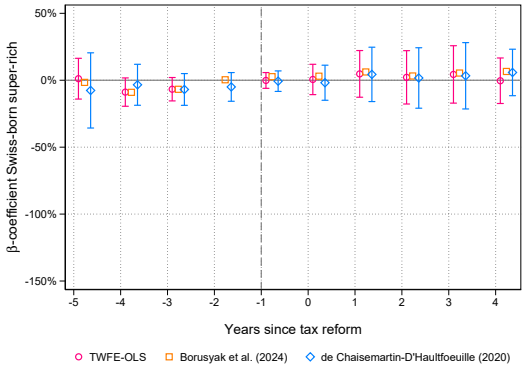
(a) Foreign-born super-rich (FE & trend correction)



(b) Foreign-born super-rich (full controls)



(c) Swiss-born super-rich (FE & trend correction)



(d) Swiss-born super-rich (full controls)

Figure B5: Cumulative Event Study – Alternative Estimators

Note: This figure shows the cumulative effects of removing expenditure-based taxation on the number of foreign-born (Panel (a) and (b)) and Swiss-born (Panel (c) and (d)) super-rich in abolition cantons (see Equation 2) using **different** DD estimators. Estimates are relative to the second year prior to the abolition ($t = -2$), allowing for anticipation effects / early responses. We control for pre-trends using de-trended residuals as outcome variable (see text for details). Panels (a) and (c) correspond to a specification of Equation (2) which contains only year and canton fixed effects. Panels (b) and (d) correspond to a specification that additionally contains the full vector of time-varying cantonal controls $X_{c,t}$. Point estimates are reported with their corresponding 95% confidence intervals, with standard errors clustered by canton. The red circles correspond to our main estimates using the standard TWFE DD estimator, as illustrated in Figure 2 and Panel (a) of Figure B3, respectively. The blue diamonds correspond to estimates derived using the estimator developed by De Chaisemartin and d'Haultfoeuille (2020). The orange squares show estimates obtained using the imputation approach of Borusyak et al. (2024). Note that the inclusion of time-varying controls in our application implies that standard errors can no longer be calculated. Also, note that we follow the recommendation in Roth (2024) and display "long-differences" for both pre-treatment and post-treatment coefficients.

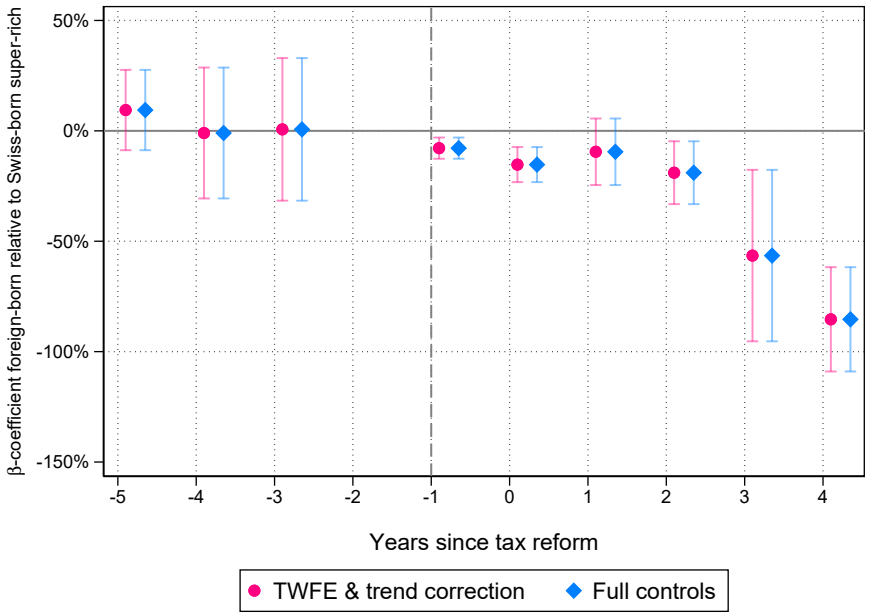
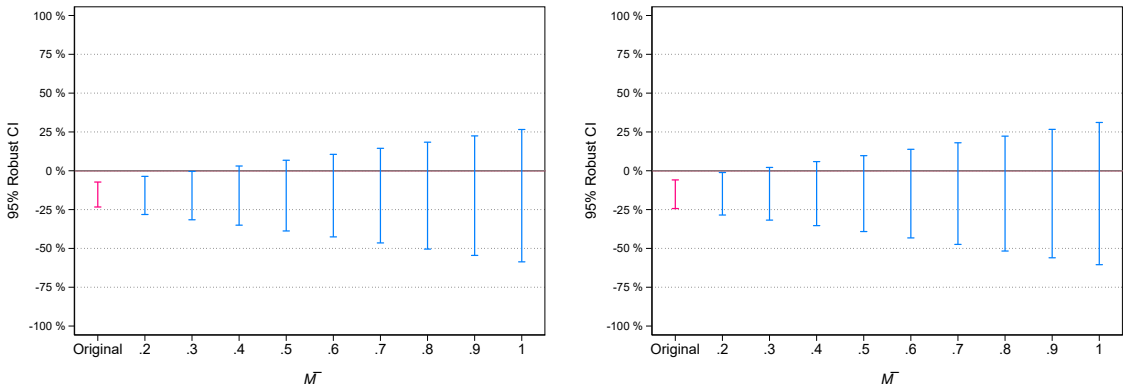


Figure B6: Triple Difference Event Study – Foreign-Born relative to Swiss-Born Super-Rich

Note: This figure shows the cumulative effects of removing expenditure-based taxation on the number of foreign-born relative to Swiss-born super-rich taxpayers in abolition cantons (see Equation 2) using a triple difference-differences (DDD) estimation strategy. The dynamic treatment effects presented in this figure essentially correspond to the difference between Figure 2 and Panel (a) in Figure B3. Estimates are relative to the second year prior to the abolition ($t = -2$), allowing for anticipation effects / early responses. We control for pre-trends using de-trended residuals as outcome variable (see text for details). The red circles correspond to a specification of Equation (2) which contains only year and canton fixed effects. The blue diamonds correspond to a specification that additionally contains the full vector of time-varying cantonal controls $X_{c,t}$. Point estimates are reported with their corresponding 95% confidence intervals, with standard errors clustered by canton.

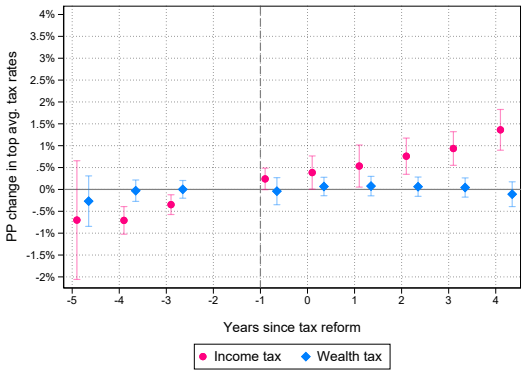


(a) TWFE & trend correction

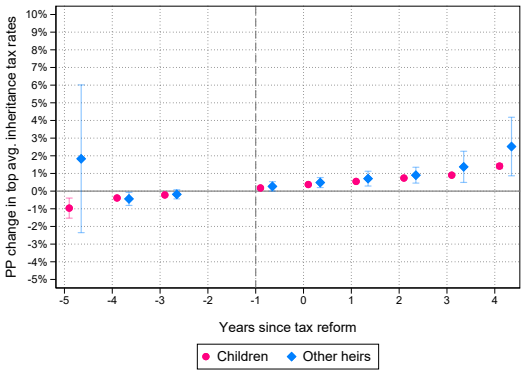
(b) Full controls

Figure B7: Sensitivity Analysis: Honest DD

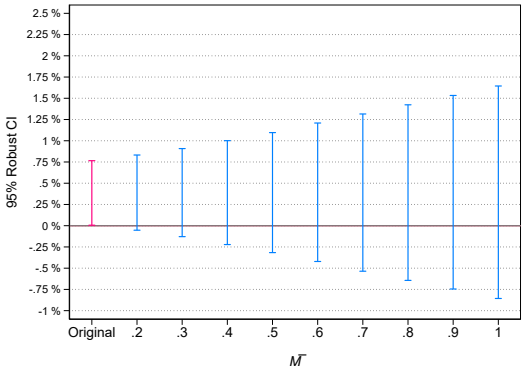
Note: This figure reports the honest DD sensitivity analysis for different values of $\bar{M}$ (Rambachan and Roth, 2023) for the estimates reported in Figure 2.



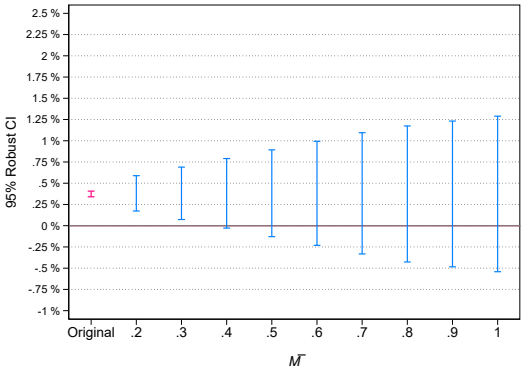
(a) Income and Wealth Tax Rates



(b) Inheritance Tax Rates



(c) Honest DD: Income Tax Rates



(d) Honest DD: Inheritance Tax on Children

Figure B8: Cumulative Event Study – Effects on (Top) Average Tax Rates

Note: This figure shows the cumulative effects of the abolition of expenditure-based taxation on personal cantonal tax rates on income and wealth (Panel (a)), and inheritance (Panel (b)) along with a sensitivity analysis of parallel trends (Panels (c) and (d)). The estimation results correspond to a specification of Equation (2), but including only year and canton fixed effects, without further controls. We control for pre-trends using the pre-trend specification suggested by Goodman-Bacon (2019). Point estimates are reported with their corresponding 95% confidence intervals, standard errors are clustered by canton. Panel (a) presents the estimation results for the average personal income and wealth tax rate for married taxpayers without children with an annual gross income of 1m CHF (red circles) and / or wealth of 10m CHF (blue diamonds), respectively. Panel (b) shows the results for the average tax rate on an inheritance of 500,000 CHF for children (red circles) or unrelated heirs (blue diamonds). Panels (c) and (d) show the sensitivity of the inference to different degrees, $\bar{M}$, of violations of the parallel-trends with respect to the worst pre-trends violation following the Honest DD approach by Rambachan and Roth (2023) in the case of income tax rates (Panel (c)) and inheritance tax rates on children (Panel (d)). None of the estimates suggest that the reforms also led to any significant changes in the tax rates we use as a control. For details on the tax rate data, see Appendix A.