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JEL Classification: H24, H31, H71, H73, R23

Keywords: mobility, Personal income tax, local taxes, Tax Competition, regressive income tax

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February 27, 2022

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1 Introduction

How responsive are top earners' location decisions to taxation when personal taxes differ across regions? And how much do especially small regions gain in terms of increased tax base and revenue when they establish themselves as tax haven for top earners?

A growing empirical literature on the spatial mobility in response to tax competition, especially of high-income individuals, has addressed these questions (see review by Kleven et al., 2019). The resulting estimates of the implied migration elasticities differ substantially across countries and institutional settings. Scholars have come to the conclusion that the mobility elasticity is not an exogenous structural parameter, but depends on a series of factors (Kleven et al., 2019; Schmidheiny and Slotwinski, 2018; Esteller-Moré et al., 2017). Besides the institutional setting, one important factor is the size of jurisdictions competing to attract top earners. Mobility responses in a within-country context therefore likely differ from responses in cross-country settings.

I add to this literature by analyzing a local tax reform in central Switzerland, which established the canton (i.e., sub-national state) of Obwalden as a residential tax haven. The goal explicitly was to attract high-income taxpayers and this was to be achieved through the introduction of a *regressive* income and wealth tax schedule. In 2006, Obwalden changed its tax code and introduced falling marginal tax rates for incomes beyond 300,000 CHF.[1] This corresponded roughly to the income threshold to belong to the top 1% of Swiss taxpayers. The introduction of the regressive scheme implied that for a single taxpayer with taxable income of 500,000 CHF (approx. 512,000 CHF gross income), the statutory average cantonal income tax rate fell from 17.9% to 14% after the reform. For an otherwise identical taxpayer with taxable income of 300,000 CHF (approx. 312,000 CHF gross income), the average tax rate in contrast only fell from 17.6% to 16.6%, as illustrated in Figure 1.[2] The annual wealth tax became regressive for net wealth exceed-

[1] Approximately 233,000 USD in 2006 and 300,000 USD in 2016, due to the continuous appreciation of the Swiss Franc towards the US Dollar.

[2] The *effective* average income tax rate—including the federal income tax—among taxpayers above the regressive threshold living in the canton fell from 30% to 26%; see Figure 7. This change in effective tax rates also includes changes in the composition of high-income taxpayers, as they responded to the

ing five million CHF. Later on, in 2008, a flat rate tax was introduced, which lowered average tax rates even more, but this time for all taxpayers.

This reform therefore allows to exploit a sharp, sizable and—as I show—very salient decrease in marginal and average tax rates. Since in Switzerland taxation is residence based, it was sufficient for taxpayers to move to Obwalden to take advantage of the low tax rates. I exploit variation over time, across cantons, and across different groups of taxpayers to identify the pull effect of this pro-rich tax policy in Obwalden.

The Swiss setting is particularly interesting, as it comes close to Tiebout's (1956) model world, where taxpayers can freely relocate and vote with their feet. The income tax applies to all forms of income, without distinction between labor and capital incomes. Employees, self-employed, and rentiers can therefore all take advantage of local income tax differences by relocating. Indeed, income segregation of high-income taxpayers is a well-documented phenomenon in Switzerland (Kirchgässner and Pommerehne, 1996; Feld and Kirchgässner, 2001; Schmidheiny, 2006; Schaltegger et al., 2011; Roller and Schmidheiny, 2016). Roller and Schmidheiny (2016) further show that this segregation leads to a de-facto regressive tax scheme, where taxpayers with incomes above one million CHF exhibit falling average tax rates, because they strategically sort into cantons and municipalities with low tax rates.

Despite this compelling evidence and Switzerland's long tradition of tax competition, only few estimates exist on the migration elasticity with respect to the net-of-tax rate. Schmidheiny (2006) develops an extensive location choice model and shows that for relocating households in the area of Basel, low tax levels attracted high income individuals in 1997. Schmidheiny and Slotwinski (2018) study location choices of foreigners within Switzerland, but their estimates—although significantly positive—are surrounded by large confidence intervals. Brülhart et al. (2021) present a structural model and estimate the tax-base and housing-price elasticities with respect to taxes. Using municipality-level data for Switzerland, they find that households with children are less mobile than

reform.

households without children. For the latter, the tax base elasticity is 1.1.[3] Liebig et al. (2007) use the 2000 census and find that migratory responses are concentrated among Swiss college graduates. Unfortunately, their study is based on estimated labor income, and it excludes capital income, which is more mobile than labor income.

I fill this gap using very rich administrative federal and cantonal tax data. The latter captures income and wealth in great detail, and includes the exact moving date to the canton of Obwalden. The analysis of the reform proceeds in four steps. I first compare the evolution of the tax base in Obwalden to that in all other cantons. Second, I estimate the stock and flow elasticities of high-income taxpayers in the canton with respect to the net-of-tax rate. Third, I study the effects of the reform on tax revenue. The last part of the paper sheds light on whether the reform had positive externalities, especially job creation.

Using federal income tax data, I first analyze (i) the population share of high-income taxpayers living in a canton, and (ii) net income per taxpayer in Obwalden in comparison to other cantons in a DiD setting. Event Study results indicate that the reform had the intended effect: by 2016, the share of high-income taxpayers in Obwalden had grown by 0.53 percentage points relative to other cantons. This is an increase of 100% compared to Obwalden's initial share of top earners. Net income per taxpayer had risen by 17%. DiD estimates suggest that over the entire 2006–2016 period, income growth compared to other cantons was strongest among high-income taxpayers (+26% over the period relative to the 2005 baseline), but real income per taxpayer also rose among those below the regressive threshold (+7% relative to 2005 in comparison to all other cantons).

Next, I estimate the elasticity of high-income taxpayers in the canton with respect to the net-of-average-tax rate (i.e., one minus the average tax rate), using individual cantonal income tax data from Obwalden for the period 2001–2010. To ensures that only the tax rate changes caused by the reform are used for identification, I instrument the tax

[3]In addition, Brülhart et al. (2021) show that families have stronger preferences for locally provided public services, of which schooling is a large part. I do not include public goods in my analysis, as they seem to matter less for top earners, who are the subject of study here.

rate with the reform, i.e., with the DiD interaction term. The identifying assumption is that the reform affected tax rates, but that it did not directly affect the number of high-income taxpayers other than through the tax rate (see Section 4.2.1 for details). I find a large elasticity of in-migration of up to 7.2 in the five years after the reform. Moving responses were immediate and flattened out somewhat over time. The more precisely identified elasticity of the stock of high-income taxpayers living in the canton (which also accounts for residents who stayed but would otherwise have moved elsewhere), lies in the range of 1.5–2. While I do not observe the exact place of work of high-income taxpayers, I do not find that in-movers with high incomes were more likely to also work in the canton of Obwalden. They actually had slightly longer commutes in the post-reform years than before. Furthermore, the majority of treated taxpayers moving to Obwalden were active in the labor force when they moved.

Although these elasticites may strike the reader as very large, I argue that they are plausible and reflect institutional features. Elasticities are larger (i) in settings which come close to a Tiebout (1956) model world without restrictions with respect to profession, income source, nationality, or origin to take advantage of lower taxes in an other jurisdiction; (ii) when tax changes are large and salient; (iii) within small areas, where moving distances and hence the costs of moving are low; and (iv) in jurisdictions starting from low levels of migration, as it is typically the case in small states or countries. These factors help to benchmark elasticity estimates.

Point (i) implies that the less frictions taxpayers face, the larger the observed mobility response will be. As highlighted by Kleven et al. (2019) and Schmidheiny and Slotwinski (2018), estimates may be strongly affected by the institutional setting. In contrast to Switzerland, where taxation is purely residence based, the setting in other countries may strongly limit the possibility to reduce one's tax burden by simply changing the place of residence. In the U.S. for example, only some states have reciprocal agreements, allowing to tax individuals in their place of residence. For most taxpayers, labor income taxation is source-based, in which case relocation alone has no effect on the tax burden. The

institutional setting in the U.S. and the much larger size of the country may explain why Young and Varner (2011) and Young et al. (2016) find only small moving responses between U.S. states. Using different, arguably more detailed data, Rauh and Shyu (2020) report migration elasticites of 4–4.6 in response to a large tax increase in California.

Points (ii)-(iv) contribute to the larger elasticities in within-country contexts (salience of tax rate differentials will likely be larger among residents within than across countries). Findings in Schmidheiny and Slotwinski (2018), who exploit a tax change that applies to foreigners after living in Switzerland for five years and report even larger elasticites, support this view. My estimates lie precisely at the lower end of their (large but strictly positive) 95% confidence interval.

Compared to results obtained in other countries with different settings, my findings should therefore be thought of as observed migration elasticities when major frictions are largely absent.

In the third part of the analysis, I turn to revenue effects. While the reform was successful at attracting high-income taxpayers, DiD estimates of the change in cantonal tax revenue show that the reform did not increase revenue. Comparing the effective top marginal tax rate with the revenue-maximizing rate shows that prior to the reform Obwalden already was on the left side of the Laffer curve, where the slope is positive and hence tax reductions do not increase revenue. This explains the adverse revenue effects despite the large inflows. With the exception of Agrawal and Foremny (2019), who also find negative revenue effects, the empirical literature has not addressed the revenue effects of reducing tax rates for top earners.

My findings raise an important question from a policy perspective: what do jurisdictions gain from tax competition if not tax revenue? I address this point in the fourth and last part of the paper. Local job creation and structural change may be one such positive externality of a local income tax reform. DiD results suggest an increase of 2.3–4% in cantonal employment. Job growth took place in high-skill professional jobs, low skill service jobs, and construction and real estate services. However, this effect on job

creation may be also driven by the simultaneous reduction of the corporate income tax.[4] The bottom line therefore is that I find no convincing evidence to support the view that aggressively reducing top marginal tax rates to attract rich taxpayers leads to significant gains for a jurisdiction—even when the mobility response of high-income taxpayers is large.

This paper adds to the growing literature relying on large tax changes to estimate the mobility of high-income taxpayers (see for example Young and Varner, 2011, Young et al., 2016, and Moretti and Wilson, 2017, for the U.S.; Agrawal and Foremny, 2019, for Spain; Kleven et al., 2014, for Denmark; or Rauh and Shyu, 2020 for California).

A related strand of literature has studied location choice responses to taxation on wealth. Brülhart and Parchet (2014) study the effect of abolition of bequest taxes in Switzerland and find limited effects on location choice, as do Bakija and Slemrod (2004) for the U.S. It seems that death taxes only have an effect on the super rich, as shown in Moretti and Wilson (2022), who study U.S. billionaires. In the case of recurring wealth taxes, Brülhart et al. (2020) find a large semi-elasticity of the wealth tax base of 0.46. However, less than one third of this response can be attributed to taxpayer mobility. For Spain, Agrawal et al. (2020) find that the stock of wealthy taxpayers in Madrid rose by 10% relative to other regions after the five years during which Madrid levied no wealth tax while other regions did (although fake moves cannot be ruled out in their setting).

The remainder of the paper is organized as follows. Section 2 describes the tax reform in Obwalden. The two main data sets used in this study are presented in Section 3 along with some descriptive evidence on the effects of the reform. I describe the different identification approaches and the empirical results in Section 4. Section 5 concludes.

[4]For the high-income in-movers, however, I do not find that they were more likely to work within the canton after the reform than before.

2 Income and Wealth Tax Reform in Obwalden

Summary of the Swiss Tax System. Switzerland has a strongly federal tax system, with personal income taxes at the federal, cantonal, and municipal levels. Each canton has its own tax code with its own, typically progressive tax schedule. Municipalities within a canton levy a multiple (or fraction) of the cantonal tax by setting a municipality tax multiplier. Hence, the municipality multiplier shifts the cantonal tax curve up or down.[5] This results in substantial variation in tax rates at the cantonal and municipal level. Taxes are purely residence based, such that taxpayers can shop for tax rates by moving their residence from one municipality to another, irrespective of their workplace. Like in a Tiebout (1956) model, cantons and municipalities therefore compete—especially for of top earners and wealthy individuals.

It is mandatory to register as a resident in the municipality and one can have only one main residency. Tax authorities are aware of the potential for fake residencies for tax reasons and will investigate doubtful moves (see "Fake Moves" below for details). The reference for the location of tax liability is the place of residency on December 31 of a given year. Taxes are owed on the total sum of all incomes from any source, i.e., including labor, capital, and transfer incomes. Therefore, income from self-employment as well as income from transfers, e.g., unemployment benefits or alimony, is included in the global income definition and taxed in the municipality of residence of the taxpayer. If a self-employed decides to incorporate, their business will be subject to corporate income taxation and they appear as employee in the tax data, since their business pays them a salary. Paid out dividends are taxed as personal income, too. However, they are only partially taxed when the beneficiary is a majority shareholder, to reduce the incidence of double taxation of corporate gains at the corporate and personal level. Realized capital gains, in contrast, are not considered earned income and are therefore not taxed as income (but they are covered by the wealth tax).

Intercantonal tax competition is strong and includes corporate income taxation: each

[5]For a detailed overview of the Swiss tax system, see Appendix A in Martínez (2017).

canton sets their own rate for corporate income and municipalities again apply a multiplier. In addition, the Federation applies a uniform tax rate on corporate income. Similar to individuals, corporations can choose in which canton they want to register. To avoid fake moves and letterbox companies, tax authorities will require proof that the headquarters, i.e., the administration of the business, is indeed physically located in the canton where the company is registered. While this implies that someone needs to be employed at the headquarters, it is well possible that the major part of employees are located in another canton or even abroad.

All cantons and municipalities—but not the Federation—further levy a tax on personal wealth. Again, each canton sets their own schedule and municipalities apply their own tax multiplier. Analogous to the global income definition, wealth taxes are due on global wealth and include not only financial assets but also real estate, cars, art and collectibles. Typically, these items are assessed at their insurance value. Like with the income tax, the reference date is December 31 of a given year. Capital gains are therefore taxed as wealth—irrespective of their realization. Household items such as furniture are excluded from the wealth tax. By international standards, the wealth tax is low and applies a low exemption threshold of around 100,000 CHF per adult.

Objective Behind Obwalden's Tax Reform. Obwalden is located in the center of Switzerland in close proximity to at least three cantons (Nidwalden, it's direct neighbor, Zug, and Schwyz) deemed as tax havens, as they have long been very successful at setting low tax rates and attracting high-income taxpayers. Obwalden in contrast was a small, rather poor high-tax canton.[6]

The cantonal parliament suggested a two-step tax strategy to establish Obwalden as a tax haven. First, Obwalden was to strengthen its position by actively engaging in intercantonal tax competition for high-income taxpayers and firms. In a second step in the

[6]Table A1 shows a series of macroeconomic characteristics for Obwalden, low- and high-tax cantons in the region, similar cantons in other regions, the two largest cantons Zurich (ZH) and Bern (BE), and Switzerland as a whole in 2005. The map in Appendix Figure A1 further shows average tax rates across Swiss cantons and municipalities as of 2005.

near future, the overall tax load was to be lowered.[7] After covering initial revenue losses, the reform would eventually pay for itself. Due to its geographic location at the heart of Switzerland and the small size of the country, mobility costs are low and commuting times to urban centers like Lucerne, Zug, and Zurich lie within a reasonable range of 20–60 minutes. It was deemed feasible to attract high-income taxpayers even if their workplace was outside Obwalden.

Obwalden's Tax Reform in Practice. In 2006, Obwalden introduced a regressive tax schedule with marginal rates declining at taxable incomes above 300,000 CHF, and on taxable wealth exceeding 5 million CHF, as depicted in Figure 1. Obwalden's aim explicitly was to compete with the competitive tax rates of the neighboring tax havens to attract high-income and wealthy individuals. And while tax cuts for top incomes are not unusual, the introduction of a regressive tax scheme was very unique, even in the Swiss context. The example comparison of tax rates in Nidwalden and Obwalden shown in Figure 2 illustrates this beggar-thy-neighbor tax strategy.

The tax on corporate earnings, formerly in the range of 9-11%, was reduced to a unique cantonal rate of 6.6%, the lowest in the country at that time. While this paper focuses on personal income taxes, I address the potential confounding influence of the corporate tax rate change in the analysis.

Initial losses in tax revenue induced by this tax strategy were to be financed through exceptional payouts each canton had received from large gold sales by the Swiss National Bank in 2005.[8] Most cantons used this windfall gain by large for debt reduction, sometimes combined with (future) tax reductions. In Obwalden, 23.5 out of the 134.5 million CHF the canton had received, were allocated to financing initial losses in municipalities' tax revenue over the first five years after the reform. This sum corresponded to almost 50% of cantonal tax revenue at that time.

[7]This line of reasoning was shared with the voters in the official information material for the popular referendum on the new tax law: "Abstimmungsbotschaft Kantonale Volksabstimmung vom 11. Dezember 2005", Kanton Obwalden.

[8]Each canton received a share of the total windfall gain corresponding to its population share.

The introduction of the regressive tax scheme had been decided by the cantonal parliament in October 2005 with 39 against 4 votes, and was confirmed by 86% of the voters in the mandatory popular referendum held on December 11, 2005. The scheme immediately became effective as of January 1, 2006. However, to take advantage of the low taxes it was sufficient to officially reside in Obwalden as of December 31, 2006, the reference date defining the location of the tax liability. Hence, individuals from other cantons had roughly 12 months to relocate to Obwalden and benefit from the low tax in the first year already.

Change in Tax Rates. Figure 1 shows the different pre- and post-reform tax schedules for the municipality of Sarnen, the main town and largest of seven municipalities in Obwalden.[9] Panels a) and c) of Figure 1 depict marginal and average income tax rates, respectively. Under the regressive scheme introduced in 2006, the local average income tax rate (excluding federal taxes) reached a maximum of 16.6% at 300,000 CHF and was down to 12.4% at 1.8 mio CHF. Hence, income earners with incomes above 300,000 CHF taxable income benefited substantially from the tax cut in 2006 (red line), while those with incomes below that threshold faced similar or slightly lower marginal tax rates than before the change. With the introduction of the flat rate tax in 2008, taxable incomes below 340,000 CHF saw a decrease in marginal rates, while incomes exceeding this threshold were now again taxed at a higher marginal rate than during the regressive period—yet not as high as before the 2006 reform. Note however, that even for top earners, this cut in marginal rates translated into lower average tax rates post 2008 (Figure 1.c). Only taxable incomes above 555,100 CHF were taxed at a slightly higher average rate than in 2006—but still at a lower rate than prior to the regressive reform.[10]

For wealth (Fig. 1 b) and d), in 2006 the average rate reached its maximum of 2.58‰ at 5 mio CHF. For a net fortune of 10 mio CHF, the average rate was 2.04‰. The cuts in the—comparatively low—wealth tax rate were substantial at all wealth levels in both,

[9] As every municipality sets its own multiplier, the tax curves are shifted up- or downwards in different municipalities. Appendix Figure A2 shows the evolution of municipality tax multipliers in Obwalden.

[10] In all other municipalities, this break-even point was even higher, reaching 658,600 CHF in Lungern.

the 2006 and 2008 reforms.

In principle, municipalities could have tried to counteract the reform by increasing municipality tax rates. However, as the tax rate schedule is set at the cantonal level and municipalities can only change the tax multiplier, they would not have been able to circumvent the regressive schedule but would have had to increase taxes for their residents across the board, by increasing their multiplier. In all seven municipalities in Obwalden, the multipliers remained stable after the reform (see Figure A2 in the Appendix).

Salience. Starting in October 2005, the proposal and introduction of a regressive income tax had gained large media attention in the whole country and this attention grew considerably once the introduction had been decided upon at the ballot. Left-wing politicians across the country protested heavily against this new tax law and brought the case to the Federal Court. The canonical view in the media and academia, however, was that the Federal Court had no say in this and was not going to rule, due to the large set of rights the constitution guarantees to cantons in taxation matters. It therefore came as a surprise for many observers including the President of the Cantonal Conference of Financial Directors when on June 1, 2007, the court ruled in favor of the plaintiffs, obliging Obwalden to change its tax schedule. To guarantee legal certainty, the regressive schedule remained valid for the tax periods 2006 and 2007. Keeping the promise of lowering taxes for everyone and offering attractive conditions for high-income households, the canton was then the first to introduce a flat rate tax, with a general exemption of 10,000 CHF, effective January 1, 2008. To respond to this change, it was again sufficient for individuals to move by December 31, 2008.

Fake Moves. The law and many cantonal and federal court rulings attempt to inhibit fake moves for tax avoidance. A taxpayer who wishes to register for a second residence and claim weekly residency undergoes an interview with the authorities of the municipality where they would like to be a weekly—and hence non-taxed— resident. The municipality establishes the tax liability based on where the taxpayer's center of life is, taking into

account size and cost of the second residency, where someone is part of a sports or social club, at which of the two homes one spends the weekends, where the children attend school and the like. The data show that among the top earners who moved to Obwalden, only 2.1% claimed week-day residency elsewhere.

Rate-Determining vs. Taxable Income. The Swiss tax system draws an important distinction between taxable and rate-determining income. Incomes earned abroad as well as real-estate income from other cantons are taxed at the source. To avoid double taxation, these incomes are not subject to the income tax in the canton of residence and are hence excluded from the taxable income definition. To ensure that the average tax rate nevertheless reflects the economic potential (*wirtschaftliche Leistungsfähigkeit*) of the taxpayer, the tax rate is calculated using rate-determining income, which takes all incomes into account as if they were earned in the canton of residence and allowing for all applicable deductions (e.g., maintenance cost of real estate). This average tax rate is then applied to the taxable income. Since it is rate-determining income which puts taxpayers either above or below the regressive part of the tax scheme, in what follows the treatment and control groups are defined according to their *rate-determining* income.

3 Data

3.1 Federal Income Tax Data

I make cross-cantonal comparisons and run DiD estimations to assess the effect of the reform on the share of high-income taxpayers and on average income in Obwalden using federal income tax data. The individual federal income tax data has the advantage that it allows comparing incomes across cantons and over time, since the definition of taxable income is identical across cantons and has remained remarkably stable over time. I base the analysis on the period 1994–2016, which allows controlling for pre-reform trends.[11]

[11]Prior to 2001, Switzerland had a biennial praenumerando tax system, hence data is available only bi-annually. For details on the praenumerando tax system and the change to the postnumerando system

While this data is encompassing in time and space, it is limited in scope. The available income variables are taxable and net income (called *Revenu net* or *Reineinkommen*). Net income is net of mandatory social security contributions and itemized deductions, but not net of social deductions nor taxes. Income includes labor and capital incomes (but no realized capital gains, as explained in Section 2). Available individual characteristics are marital status, number of children, employment status (employee, self-employed, non-working), and municipality of residence. Married couples have to file jointly and a taxpayer may therefore be an individual or a married couple. Because individual identifiers are set at the cantonal level, it is not possible to track individuals over time once they leave their canton of residence. Wealth is taxed at the cantonal and municipal level only, hence the individual federal tax data do not contain information on wealth.

Descriptive Statistics. Obwalden (OW) experienced a large increase in high-income taxpayers after 2005: within one year, their number rose by 50%, and by 2010 their number had doubled relative to 2005. The total number of taxpayers remained constant, hence the increasing number of high-income taxpayers was not driven by overall population growth. No other canton experienced a similar increase during this period. The income sum in the top bracket rose even slightly more than the number of taxpayers, implying that the group of high-income taxpayers had higher average incomes than before the reform.[12] The steep rise observed in Obwalden after 2005 is therefore a unique phenomenon, unlikely due to spurious correlation caused, for example, by a positive income shock in 2006 affecting the top 1% in the whole country.

3.2 Obwalden Cantonal Income and Wealth Tax Data

To overcome some of the limitations of the federal income tax data, I use individual income tax data from the Canton of Obwalden for the period 2001–2010. What makes the data unique is that the records contain the exact date when a taxpayer registered with

in the late 1990s, see Martinez et al. (2020).

[12]Figure A3 in the Appendix gives an overview of the evolution of taxpayers and income in Obwalden compared to other cantons.

the municipality, along with their municipality of origin—or the country of origin if they moved-in from abroad. This allows to shed light on the moving behavior of taxpayers. The panel data further contain the full information collected in the annual income tax returns, such as all sources of income and all claimed deductions, as well as some basic information about each tax unit (age, nationality, marital status, number of dependents, self-declared occupation, industry code).

In turn, the data are limited to taxpayers with a tax liability in the canton of Obwalden during the period 2001–2010. Because individuals have a cantonal rather than a national tax ID, it is not possible to link individual tax data from different cantons. I therefore lack information on wealth and incomes earned before moving to Obwalden or after leaving the canton. Therefore, I cannot identify the intentionally treated non-movers living in other cantons.

Obwalden being a small canton, the number of observations is relatively small. The total population was roughly 35,000 individuals in 2010 (0.5% of the Swiss population), corresponding to 18,000–22,000 taxpayers each year. All Swiss cantons engaging successfully in tax competition are small in terms of population and geographical area. This is in line with theory and makes sense intuitively: a small, open economy can expect large relative gains in its tax base from cutting taxes, but faces relatively small losses in foregone revenue (for theory on asymmetric tax competition where countries differ in size, see Bucovetsky, 1991, Wilson, 1999; for empirical evidence see Winner, 2005, Buettner, 2003). Obwalden's proximity to the cities of Lucerne, Zug, and Zurich harbors potential to attract high-income taxpayers seeking a reasonably centrally located place of residence with favorable tax climate, surrounded by natural amenities.

Descriptive Statistics. Income and wealth of in-movers increased sharply right after the 2006 tax cut. Decomposing income into different sources further shows that those moving to Obwalden after 2005 also had large labor incomes and were not solely depending on highly mobile capital incomes (nor transfer incomes, which are also mobile). This suggests that the canton of Obwalden has the potential to attract taxpayers relying on

labor incomes and not only wealthy rentiers. High-income taxpayers moving to Obwalden also come from further away after the reform, as can be seen by comparing the maps in the Panels a) and b) in Figure 3. And while information on the location of the workplace is not available in the data, I find that taxable income deductions for commuting expenses increased after the reform, implying that workers commute over longer distances than before. Taken together, this does not suggest that high-income taxpayers moved to Obwalden because they found a new, high-paying job in the canton. It seems they kept commuting to their former workplace. As I show in the robustness analysis in Section 4.2, I can rule out that the tax reform, which included the reduction of corporate taxes, did create a substantial number of new, high-paying jobs taken by in-movers.

4 Empirical Analysis

The empirical analysis proceeds in four steps. I first analyze aggregate effects on Obwalden's tax base, namely the share of high-income individuals in the canton and average income per taxpayer, compared to other Swiss cantons in an event study framework (Section 4.1). Second, I estimate the stock and flow elasticities of high-income taxpayers using a longitudinal two-stage least squares approach (Section 4.2). Third, I study the revenue effects of the reform for the canton of Obwalden (Section 4.3). Fourth, I shed light on the effects of the reform on employment in the canton (Section 4.4).

4.1 Effects on Obwalden's Tax Base

This section provides evidence that the reform was successful in increasing the share of high-income taxpayers and average taxable income in Obwalden compared to other cantons. I exploit the federal setting in Switzerland with a DiD approach to estimate the effect of the reform on Obwalden's tax base. Based on the federal income tax data described in Section 3, I compare (i) the share of high-income taxpayers —defined as taxpayers with federal taxable income above 300,000 CHF—in percent of total taxpayers,

and (ii) net income per taxpayer. The first outcome is a direct measure of whether the reform was successful in attracting and retaining high-income taxpayers, the second one sheds light on how the reform affected the income tax base on average.[13]

4.1.1 Identification Strategy

Difference-in-Differences Design. Using the following Difference-in-Differences (DiD) approach, I compare the evolution of the share of high-income taxpayers and average income per taxpayer in Obwalden to that in all other cantons in Switzerland:

$$Y_{g,c,t} = \alpha + \beta \cdot (TR \cdot PR) + \lambda \cdot TR + \gamma \cdot PR + \delta_t + \eta_g + \epsilon_{g,c,t} \quad . \tag{1}$$

$Y_{g,c,t}$ denotes the outcome at time t in a municipality g belonging to canton c. $TR = \mathbb{1}[c = 1]$ is the treatment group dummy which takes on the value of 1 for all municipalities in Obwalden and zero otherwise. $PR = \mathbb{1}[t \geq 2006]$ is a dummy indicating the post-reform period. The coefficient of interest β is the DiD estimator measuring the effect of the reform on the outcome. All regressions include time and municipality fixed effects, δ_t and η_g, respectively.

Level of Analysis and Statistical Inference. Both outcomes of interest can be measured either at the cantonal or the municipal level. This raises the question of the appropriate unit of analysis.

As tax rates vary at the the municipality level, it seems appropriate to carry out the analysis at the municipality level.[14] In addition, it is very likely that a substantial part of the unexplained variation that is captured by the error term comes from municipality characteristics, such as, e.g., the availability of land or its proximity to lakes, mountains, and other natural amenities, which are valued by high-income taxpayers (Young et al., 2016). Municipality fixed effects η_g control for such unobserved heterogeneity.

[13]Since income tax rates are applied equally to all sources of income, the analysis does not distinguish between employees, self-employed, retirees, pensioners, or other non-working individuals.

[14]Importantly, municipalities did not increase their multipliers in response to the cantonal reform, as explained in Section 2 and shown in Figure A2 in the Appendix.

An argument against carrying out the analysis at the municipality level is that this would artificially increase the number of observations and hence lowers the standard errors. I therefore also specify an alternative model with more conservative standard errors where the unit of analysis is the canton, the state level at which the intervention happened (Equation (1) remains unchanged except for the unit fixed effect which becomes η_c).

To take into account the varying size of municipalities (cantons), I weigh each observation by the number of taxpayers in a municipality (canton) in the regression using analytic weights.[15] Because the number of taxpayers is endogenous to the reform, I hold the weights fixed at the 2005 level in the post-treatment period.

In both specifications it is likely that observations within the same canton are correlated. Especially in the specification at the municipality level clusters of units, rather than units, are assigned to treatment, which makes clustering an experimental design issue (Abadie et al., 2017). The influential work by Bertrand et al. (2004) has shown the importance of clustering standard errors in panel analysis. Furthermore, errors may not only be correlated for observations within cantons, but also across observations within the same year. Following suggestions in Cameron et al. (2011) and Cameron and Miller (2015), I therefore report two-way clustered standard errors at the canton-year level. These turn out to be only marginally different from clustering at the canton level only.[16]

In a third specification with an even more conservative approach to inference, I finally run the regressions on treatment group averages, i.e., comparing Obwalden to the average of all other cantons taken together (see Angrist and Pischke, 2009, p.240, for a discussion).

As a final remark on this discussion about the correct inference, it is important to note

[15] Analytic weights are appropriate precisely to work with group means, as it is the case here. They lead to the same point estimates as frequency weights, but the approach is more conservative as standard errors are larger. The number of degrees of freedom is $m-(k+1)$, where m is the number of municipalities. Using frequency weights, the number of degrees of freedom is $n-(k+1)$, with n denoting the number of individuals.

[16] With a total of 26 cantons and 18 time periods in my data, the number of clusters is relatively small and cluster-robust standard errors are susceptible to bias when the number of clusters is small. Monte Carlo simulations reported in Cameron et al. (2011) however suggest that rejection probabilities at the 95% confidence interval are below 10% in settings with 20–30 clusters.

that in the present case, I observe the universe of taxpayers across all Swiss municipalities and cantons. Therefore, no uncertainty is introduced through sampling, on which classical inference is based. "Random sampling assumptions are not natural when considering states or counties as units of observation," as Manski and Pepper (2018) put it.[17]

Parallel Trends. The key identifying assumption of the DiD estimation framework is that Obwalden and the rest of Swiss cantons would have followed parallel trends in outcomes if Obwalden had not introduced a regressive tax scheme for top earners. Figure 4 shows the evolution of the difference between Obwalden and the rest of Switzerland for both outcomes. The graphs suggest trends were diverging prior to the reform and Obwalden was becoming poorer compared to the rest of Switzerland: the share of high-income taxpayers (Panel a) and average income per taxpayer (Panel b) were decreasing compared to other cantons. After the 2006 and 2008 reforms, the gap narrowed and by 2013, income per taxpayer in Obwalden was above the Swiss average. Similarly, the share or high-income taxpayers started rising after 2005 and Obwalden caught up with the rest of Switzerland. This suggests that if the reform had an effect, it actually reversed the negative trends in the outcomes. In this case, differing pre-reform trends, would lead to an underestimation of the true size of the effect of the reform on Obwalden's tax base.

To correct for potential differences in pre-existing trends, I adjust the outcome variable as follows: I first regress outcome $Y_{g,c,t}$ for all years *prior to the reform* on canton fixed effects and canton-specific time trends. Next, I regress the outcome variable $Y_{g,c,t}$ on the predicted values form this first regression, $\widehat{Y_{g,c,t}}$, over the whole sample period to finally replace the LHS variable in Equation (1) with the residuals of this second regression (this approach, suggested by Freyaldenhoven et al., 2019, is similar to the one applied by Kleven et al., 2014, who use the de-trended variable as outcome). I refer to this correction as residualized outcomes. For event studies, this approach has been implemented in the

[17] Abadie et al. (2020) develop an alternative concept for drawing inferences when one observes the entire population, where the uncertainty stems from unobservability of some of the potential outcomes. They show that in this case, in large samples robust standard errors are too conservative. Unfortunately, there is no simple finite-population correction to the robust variance estimator for causal estimands, which is the correction that would be needed in the present case.

xtevent Stata package by Freyaldenhoven et al. (2021b).

Event Studies. I estimate the reduced-form effect of the tax reform on Obwalden's tax base using an event study to (i) study the validity of the parallel trends assumption required for the DiD approach, and (ii) asses the timing of the responses. I consider the following specification:

$$Y_{g,c,t} = \alpha + \sum_{k=-11}^{11} \beta_k \cdot R_{c,t}^k + \delta_t + \eta_g + \epsilon_{g,c,t} \tag{2}$$

$Y_{g,c,t}$, δ_t, η_g, and $\epsilon_{g,c,t}$ are defined as in Equation (1) above. Important are the covariates $R_{c,t}^k$ for $k = -11, .., 11$, which represent a sequence of event time dummies that are k years away from the 2006 tax reform in Obwalden. The coefficients of interest are the β_k that capture the deviation in the outcome k years before and after the reform in Obwalden for municipality g in canton c. The year 2005, just prior to the reform, $k = -1$, serves as reference period. The plausibility of the identifying assumption of parallel trends in outcomes can be tested with the event study design by checking whether the dummy coefficients well before the reform $k = -11, ..., -2$ are equal to zero. Furthermore, the event study provides transparent illustration of how the reduced-form effect is distributed over time and how the correction of pre-trends affects the results.

4.1.2 Results: Effect on Share of High-Income Taxpayers

Panel a) of Figure 5 shows the event study graphs of the share of high-income taxpayers in Obwalden compared to all other cantons in Switzerland, as described in Equation (2). In line with Figure 4.a), the graph shows that prior to the reform Obwalden's share of high-income taxpayers was falling (light blue line with circles). The estimates suggest that the reform reverted this trend, as compared to 2005 the share of high-income taxpayers rose steadily after the tax reforms in 2006 and 2008. By 2016, the share of high-income taxpayers had increased by 0.48 percentage points compared to other cantons. With the pre-trend correction, the increase is even 0.53 larger (and had reached almost 0.68% in

2015). This corresponds to an increase of 100% relative to Obwalden's share of high-income taxpayers in 2005.[18]

Table 1 shows the corresponding DiD estimates of the share of taxpayers with taxable income above 300,000 CHF in each municipality, estimated according to Equation (1) and extensions thereof. Top Panel A shows results at municipality level, with two-way clustered standard errors by canton-year and by municipality. The more conservative approach based on canton level data is shown in Panel B, where standard errors are clustered by canton and by year. Results are highly robust to changing the level of analysis. Overall, the estimates suggest that thanks to the reform, the share of high-income taxpayers was about 0.36 percentage points higher relative to other cantons over the 2006–2016 post-reform period. This is a 68% increase compared to Obwalden's pre-reform average share of 0.53%. Results are statistically significant at the 1% level. [19]

Inference in Panel B may suffer from a small number of clusters. Since the literature is inconclusive about how many clusters are too few, bottom Panel C finally takes on the most conservative approach to inference, running the regressions on treatment group averages, i.e., comparing Obwalden to the average of *all* other cantons taken together (see Angrist and Pischke, 2009, p.240, for a discussion). These estimates are smaller but remain statistically significant (heteroskedasticity robust standard errors reported in parentheses), suggesting an increase in the share of high-income taxpayers of 0.28 percentage points after correcting for. Compared to pre-reform levels, this is still an increase of 53% in the share of high-income taxpayers.

If high-income taxpayers moved to Obwalden from other cantons because of the re-

[18] Appendix Figure A4 shows the event-study graph of the share of high-income taxpayers with incomes of 200,000–295,000 CHF, i.e., just below the regressive threshold. Their share rose only after the 2008 flat tax rate reform, which is in line with the tax incentive.

[19] An alternative to clustered standard errors suggested in the literature (e.g., Angrist and Pischke, 2009; Cameron and Miller, 2015) are wild bootstrap confidence intervals. In the present case, this method performs extremely poorly, as the wild bootstrap cluster confidence intervals turn out to be implausibly large: while the share of high-income taxpayers ranges between zero and 16.23% post 2005 across all municipalities in Switzerland, with an average of 1.15% and a P99 of 8.61%, the wild bootstrap confidence interval lies in the range [-13, 14]. The problem is that with only one treated cluster, the wild bootstrap clustering does not perform well and severely under-rejects the null, as discussed in MacKinnon and Webb (2020).

form, the control groups were negatively treated and the coefficients in Table 1 would be upward biased. Using information on the origin of the post-reform in-movers form cantonal tax data from Obwalden described in Section 3.2, I correct the federal income tax data by adding the number of movers back to their municipality of origin before computing the share of high-income taxpayers in the control cantons. Due to the large size of the other cantons compared to Obwalden, however, shares hardly change and the resulting estimates of the share of high-income taxpayers (not shown) only differ marginally (after the second digit) to those reported in Table 1.

4.1.3 Results: Effect on Average Income per Taxpayer

The estimated effect on the evolution of net income per taxpayer over time is shown in Panel b) of Figure 5. To reduce the effect of some large outliers in 2015 (see Panel b) of Figure 4), I top-winsorize the data at the 99th percentile on a year-by-year basis.[20] Note that while the outcome is income per capita, the shown estimates are re-scaled relative to average income in Obwalden in 2005, such that they represent percentage changes relative to that year. The event study graph does not indicate diverging pre-existing trends between Obwalden and the rest of Switzerland, and hence the pre-trend correction hardly changes the results. The effect of the reform is clearly visible from 2006 onward, as income per taxpayer in Obwalden rose compared to all other cantons in Switzerland in the post-reform years. In 2016, real average income per taxpayer was an estimated 8,986 CHF higher than in the rest of Swiss cantons due to the reform. Compared to an average income per taxpayer of 53,758 CHF in 2005, this is an estimated increase of 16.7%.

Table 2 shows the DiD regression results. Baseline estimates (Columns 1–2) suggest that real income per taxpayer in Obwalden increased by almost 14% with respect to the pre-reform average relative to other cantons.[21] Results are significant and robust

[20] The outlier in 2015 is most likely due to the IPO of a large commodity trader, which caused extremely large incomes for a small number of individuals living in central Switzerland.

[21] Excluding 2015, the estimate still amounts to a 10% relative increase in the post-reform period.

to the correction of pre-trends (Column 2). Splitting the sample into individuals below and above the regressive cut-off shows that income per capita among those with income below 300,000 CHF (Column 3) rose by 3,300 CHF relative to other cantons (i.e., + 6.7% compared to 2005). However, this relative effect was substantially larger among the high-income taxpayers, whose income per capita rose by 26% compared to 2005, suggesting that the group of high-income taxpayers had become richer in the post-reform period relative to top earners in other cantons (Column 4).

Column 6, rather than using municipality (canton) as the unit of analysis, uses municipality (canton) *cells* of average income per taxpayer for different socio-economic groups, defined by their civil status (married, single parents, married with children, and single taxpayers with no dependents as reference category), and employment status (self-employed, non-working, retiree, and employee as reference category). Since these characteristics are correlated with different income levels and the socio-economic composition of taxpayers may vary across jurisdictions, this specification controls for variations in municipalities' (cantons') socio-economic composition. Controlling for these factors lowers the estimated increase in income per taxpayer relative to other cantons to approximately 2,000 CHF (implying an increase of 3.7% compared to 2005) and the effect is statistically only marginally different from zero.

For robustness, bottom Panel C again reports the most conservative estimates based on treatment group averages (heteroskedasticity robust standard errors in parentheses). Models 1–3 lead to very similar results as on the canton and municipality level. Only the estimations in Columns 4–5 are not statistically significant in this conservative approach.

4.2 Stock and Flow Elasticities of High-Income Taxpayers

Section 4.1 has shown that the reform did have a positive effect on the tax base. This section aims at obtaining elasticities that directly relate the responses of the tax base to the magnitude of the tax change caused by the reform.

Theoretical foundations of tax-induced mobility go back to Epple and Romer (1991).

Although in practice a large body of the literature relies on reduced form estimates, some authors such as Schmidheiny and Slotwinski (2018), Akcigit et al. (2016), and Kleven et al. (2013) include formal frameworks. The migration elasticity with respect to the net-of-average-tax rate can formally be derived from a location choice model, where taxpayers compare expected utilities across the universe of municipalites in the country. The model in Schmidheiny and Slotwinski (2018) fits the Swiss institutional setting and includes predictions on heterogeneous responses depending on the distance and cost of moving. For simplicity, I abstain from recapitulating these standard models here and refer the interested reader to previous work. Importantly, as I do not have panel data on the universe of Swiss taxpayers, rather than estimating a structural location-choice framework, I estimate reduced form models.

To estimate the elasticity of the in-flow and the stock of high-income taxpayers in the canton with respect to the net-of-average-tax rate, in this section I use the individual cantonal income tax data from Obwalden described in Section 3.2. This data allows to identify movers who moved to Obwalden in a given year. The analysis proceeds in two steps. I first follow a DiD approach comparing income groups affected differently by a tax change. As control group, I define taxpayers with income just below the regressive threshold of the tax scheme, a common approach in the literature (see for example Kleven et al., 2014; Kleven and Schultz, 2014; Sillamaa and Veall, 2001; Auten and Carroll, 1999). In a second step, I estimate the tax rate elasticity of high-income taxpayers with respect to their location decision. To exclude variation in tax rates that does not come from the 2006 and 2008 tax reforms, I instrument the tax rates using an instrumental variable (IV) approach and estimate a two-stage least squares (2SLS) model.

4.2.1 Identification Strategy

Reduced-Form Difference-in-Differences Estimation. To estimate the effect of the reform on the stock and inflow of high-income taxpayers, respectively, I aggregate the individual data into year t, treatment group $i = \{0, 1\}$ cells and estimate a DiD model of

the form:

$$N_{i,t} = \alpha + \beta \cdot (TR \cdot PR) + \lambda \cdot TR + \gamma_t + \epsilon_{i,t} \quad ,$$

where $N_{i,t}$ denotes the number of taxpayers in group i, $TR = \mathbb{1}[i = 1]$ is the treatment group dummy, $PR = \mathbb{1}[t \geq 2006]$ is the post-reform dummy, and γ_t are year fixed effects (which in practice will absorb the post-reform indicator). The coefficient of interest β is the DiD estimator on the average annual increase in the number of residents or in-movers, respectively, after the introduction of the tax reform in 2006. To isolate the effect of the regressive income tax reform, in a first specification I exclude years after 2007 and hence the 2008 flat rate tax reform. With seven years of observations (five pre- and two post-reform), and two groups, this leads to 14 group-year cells for the regression analysis. In a second specification, I include all available post-reform years (up to 2010) to estimate the overall effect of the two reforms, in which case the regression analysis is based on 20 observations.

Definition of Control Groups and Parallel Trends. The control group is defined as having rate-determining income below the regressive threshold, yet the income range to be considered to obtain a valid control group depends on a number of considerations. Theoretically, one would want to use taxpayers just below the threshold. In practice, however, it may not always be clear to the taxpayers themselves whether their rate-determining income will be just below or just above the threshold. Taxpayers just below the threshold might have expected to be above the threshold or expected to reach higher income levels in the near future, in which case they were affected by the treatment. Or their former canton (or country) of residence's income definition resulted in a higher taxable income than the taxable income they had according to Obwalden's tax laws. Defining the control group through an income range which is further away from the threshold is a way to ensure the control group did not respond to the treatment due to the aforementioned reasons. In addition, the control group must be sufficiently large. Finally, for the control group to be valid, it must fulfill the parallel trends assumption in

the pre-reform years.

Figure 6 shows event study graphs for four different definitions of control groups for the stock (Panel a) and the inflow of high-income taxpayers (Panel b). The control group with incomes in the range of 60%–80% of the threshold clearly fulfills the parallel trends assumption in the years prior to the reform and I use this group as the main control group in all specifications (I report results on other control groups for robustness). Figure A5 in the Appendix further shows the absolute number of treated taxpayers compared to the control group over time.

Balance of Treatment and Control Groups. Table 3 presents descriptive statistics for the treatment and control groups. While they differ from the average taxpayer living in or moving to Obwalden, they are similar to each other in most characteristics. Taxpayers in the treatment group are more likely to be foreigners, and they derive a larger share of their income from capital and self-employment than the control group. They also moved to Obwalden from places further away. Only a very small number of taxpayers benefit from some sort of weekly residency elsewhere. Their share is lowest among the treated, with 0.6% in the stock and 2.1% among the inflow of taxpayers. Top earners in Obwalden are therefore not just weekend residents for tax purposes with a regular residence elsewhere. Although I lack information on taxpayers' workplace, self-reported occupations or professions reveal that these high-income taxpayers are professionals including doctors, lawyers, and economists. 52% are employees, and about 15% are self-employed. The remaining 33% are retirees or non-active in the labor market.

In the total population there where no shifts in the origin of taxpayers, but the composition of the treatment and the control groups experienced some changes after the reform: in the treatment group, the share of taxpayers coming from Zurich, Bern, and from abroad increased in the post-reform years, and high-income taxpayers moved to Obwalden from 19 different cantons compared to 12 prior to the reform (see Figure 3 and Appendix Table A2). In the control group, in-movers came from 15 different cantons after the reform, and from 13 in the years 2001–2005. This suggests that the reform was

successful in attracting especially high-income taxpayers from further away.

Elasticity Estimates Using Two-Stage Least Squares (2SLS). I estimate the elasticity of the number of high-income taxpayers with respect to the net-of-average-tax rate using a 2SLS instrumental-variable approach, following Kleven et al. (2014), to isolate the variation in tax rates caused by the reform. This approach takes into account that the treatment, i.e., the tax reform, may not have perfectly determined migration decisions (for similar applications see Angrist, 1990; Waldinger, 2010).

I aggregate the individual data to year-group cells for the period 2001–2007. The elasticity is captured in the following, second-stage regression:

$$\log N_{i,t} = \alpha + \eta \cdot \log(1 - \bar{\tau}_{i,t}) + \beta \cdot TR + \gamma_t + \epsilon_{i,t} \quad , \tag{3}$$

where $(1 - \tau_{i,t})$ is the net-of-tax rate of group i. I estimate the stock and the flow elasticities, η^S and η^F, respectively, with respect to the net-of-average-tax rate, $(1 - \bar{\tau})$. In the first stage, I instrument the net-of-tax rate with the DiD treatment interaction dummy, $DiD_{2006} = TR \cdot \mathbb{1}[t \geq 2006]$. The identifying assumption is that the reform affected tax rates, but that it did not have a direct effect on the number of high-income taxpayers living in or moving to Obwalden other than through the tax rate change. The first stage therefore takes on the form:

$$\log(1 - \bar{\tau}_{i,t}) = \beta \cdot DiD_{2006} + \lambda \cdot TR + \gamma_t + u_{i,t}. \tag{4}$$

In a second set of regressions, I also add an instrument for the 2008 reform to Equation (4) to make use of the whole time frame available. The first stage is accordingly modified to:

$$\log(1 - \tau_{i,t}) = \beta_1 \cdot DiD_{2006} + \beta_2 \cdot DiD_{2008} + \lambda \cdot TR + \gamma_t + u_{i,t}. \tag{5}$$

$DiD_{2006} = TR \cdot \mathbb{1}[2006 \leq t < 2008]$ is the original DiD treatment interaction dummy,

and $DiD_{2008} = TR \cdot \mathbb{1}[t \geq 2008]$ identifies the second reform.

First Stage. The identifying variation in the net-of-average-tax rates, $1 - \bar{\tau}$, created by the 2006 and 2008 tax reforms is shown in Figure 7. In 2006, treated residents (Panel a) faced an increase of $\simeq 4\%$ in their net-of-average-tax tax rate, for the control group the net-of-average-tax rate rose by $< 2\%$. In turn, the 2008 flat rate tax reform benefited the control group substantially more than the top earners (the remaining difference in $(1 - \bar{\tau})$ after introduction of the flat rate tax in 2008 stems from the progressive federal tax). Overall, the Figure shows three clearly distinguishable tax regimes over the period 2001–2010. Looking only at in-movers (Panel b), the graph is more noisy, as their overall number is much smaller. Yet results are of the same qualitative nature: the 2006 reform substantially increased the net-of-average-tax rate of the treated, the 2008 reform led to largest increases in the net-of-average-tax rate among the control group. All first stage regressions (reported in Appendix Tables B1 and B2) are highly significant with large F statistics, and the DiD interaction term is a strong predictor of the net-of-average-tax rates. The hypothesis of weak identification is rejected in all regressions.

4.2.2 Results: Elasticity of the Stock of High-Income Taxpayers

The results for the stock of top earners are summarized in Panel A of Table 4 (with heteroskedasticity-robust standard errors in parentheses).[22] The reduced form estimates (Columns 1 and 2) suggest that in the first two years after the introduction of the regressive tax, the number of high-income taxpayers increased by 31, or by 4.5% when estimated in logs (although the latter is not statistically significant) compared to the control group. The corresponding short run elasticity with respect to the net-of-average-tax rate, η^S, is 1.5 (Column 3) and therefore in the range of the short-run elasticity estimates of 1.3–1.8 found in Kleven et al. (2014). The medium-run elasticity, based on the estimation instrumenting for both reforms described in Equation (5), leads to very similar point estimates. Using an alternative control group with incomes in the range

[22]Detailed regression results are reported in Tables B3–B5 in the Appendix.

of 60–95% of the income threshold leads to slightly larger elasticity estimates (Column 6): the short-run stock elasticity increases to 2, the medium run elasticity is 1.9. These results therefore confirm that the tax reform increased the number of top earners. This may not only be due to in-movers who were attracted (analyzed in the next section), but also to residents who would have moved away otherwise and decided to stay.

4.2.3 Results: Elasticity of the Inflow of High-Income Taxpayers

Panel B of Table 4 reports analogous results for the annual inflow of taxpayers moving to Obwalden. Due to the small number of individuals in the treatment and control groups, the underlying time series are more volatile and the estimates less precise. The reduced form estimates in Columns 1 and 2, respectively, suggest that compared to the control group, roughly 8 additional high-income taxpayers (or $\exp(0.291) = 34\%$) arrived in each of the two post reform years 2006 and 2007 due to the reform, yet the point estimates are not statistically significant (standard errors in parentheses are robust to heteroskedasticity). The corresponding flow elasticity estimate, η^F, is large and amounts to 6.5.

In contrast to the stock elasticity estimates, the inflow elasticity estimates are affected by different definitions of the control group. Since the control group might be responding to the treatment when their income is sufficiently high, redefining the control group as those with income of 55%–75% of the threshold avoids contamination of the control group by the treatment. The resulting estimates become more precise and larger. The elasticity of in-movers with respect to the net-of-average-tax rate, η^F, lies between 7.2 and 10. These estimates are 4–6 times larger than what Kleven et al. (2014) find for Denmark, but smaller than the (imprecise) estimate of 26.9 reported in Schmidheiny and Slotwinski (2018) for foreigners in Switzerland.

That medium run estimates are smaller than in short run estimates suggests moving responses were strongest right after the introduction of the reform. This stands in contrast to the findings in Kleven et al. (2014), where the elasticities build up over time. A possible

explanation for this contrast lies in the different settings: in Denmark, foreigners first had to find a high-paying job in the country to qualify for the tax scheme, while in Obwalden eligibility did not depend on the income source nor the nationality. Taxpayers who considered moving to Obwalden could do so right away, and thereby increase the time horizon of their investment.

4.2.4 Robustness Analysis

Model Specification. A robustness check using simple OLS without instrumenting the tax rate leads to similar elasticites (see Columns 4 and 6 in Tables B3 and B4 in the Appendix). Hausman tests for exogeneity indeed suggest endogeneity is not an issue here. Running the regressions reported in Table 4 using as dependent variable the share of taxpayers (defined as the percentage of the total number of taxpayers in the canton) in each year-group cell leads to almost identical elasticity estimates (reported in Appendix Table B5).

Confounder I: Wealth Tax Reform. The estimates would be upward biased if the number of high-income taxpayers rose because these taxpayers moved to Obwalden in response to the wealth tax reduction, rather than the regressive income tax. Event studies comparing taxpayers who have income *and* wealth in the regressive part of the tax schedule to taxpayers who have both, income and wealth just below the respective regressive thresholds, however, do not indicate any effect of the reform.

Confounder II: Corporate Income Tax Reform. Since in 2006 the corporate income tax was lowered too, it could in theory be the case that people moved to Obwalden because new, high-paying jobs were created there. Unfortunately, I do not observe the canton in which individuals work (and survey data, which has information on canton of work and residence, lacks taxable income and moving information). However, I can obtain a rough estimate of (i) commuting distances and out-of-canton commuters, and the data reports (ii) whether taxpayers have a weekly residency outside of Obwalden where

they stay during the week for work reasons. Both indicators would need to decline among high-income earners if they found new, well-paid work in Obwalden.

I can infer whether individuals have a commute that takes them out of the canton based on income deductions for commuting expenses, which are a function of kilometers driven or of the public transport pass chosen. Obwalden is a very small canton, where six out of the seven municipalities lie along one main road in a wide valley. Commuter deductions corresponding to driving distances of more than 25km are extremely likely to be work commutes out of the canton.[23] For public transport commuting deductions, I take the cost of the annual local commuter pass for three zones as lower threshold for commuting out of the canton, since the canton itself has only two zones. For longer commutes, e.g., to Zurich, people commuting by public transport typically use the annual Swiss train pass, which is about three times the price of the local pass for three zones and is valid on any public transport in Switzerland. This is still the cheapest option for public transport commuters who commute out of their local area.

I find that the share of estimated out-of-canton commuters has been continuously *increasing*, both in the treatment and control groups, as well as in the overall population. The share of workers who maintain a residency where they spend the week for work reasons is very small has been on decline in the general population, but *rose* slightly in the treatment and control groups group after the reform (see Figure A7). These results contradict the hypothesis that the number of high-income taxpayers in the canton rose because of newly created high-paying jobs in response to the reduction of the corporate tax rate.[24]

Finally note that was sufficient for businesses to move their headquarters to Obwalden to take advantage of the low corporate tax rate. Therefore, even if more businesses were located in Obwalden over time, this does not necessarily mean that they also created new jobs in the canton. Unfortunately, I do not have detailed yearly data on the number of

[23] Appendix Figure A6 shows topography, roads, and driving distances taken from Google Maps.

[24] Appendix Figure A8 shows the distribution of commuting distances before and after the 2006 reform. If anything, commuting distances have increased slightly after the reform, as did the share commuting by public transport.

(new) businesses in the canton to study this hypothesis.

Heterogeneous Responses. From a theoretical perspective, one would expect responses to be heterogeneous across groups, depending on whether they come from a low- or high-tax municipality, whether their former place of residence was close or far, whether they are active in the labor force or not, and so forth. Unfortunately, there are too few observations in the different subgroups to repeat the analysis presented in Table 4 for movers. The series are very erratic, the parallel trends assumption does not hold, and because there is not always an in-coming taxpayer from each group (e.g., a retiree or someone coming from a low-tax municipality), I cannot compute the tax rates and corresponding elasticities.

For the stock of residents, the series are stable, but the parallel trends assumption does not always hold. The results of this heterogeneity analysis (shown in Table 5) therefore have to be interpreted with caution. They suggest that my findings reported in Table 4 are driven by taxpayers who are active in the labor force. They represent the largest group of high-earning in-movers, and their stock is estimated to have increased by 18.8% due to the reform, with an implied elasticity of 4. The elasticity is therefore 2.6 times larger than in the baseline, and estimates are robust to different control group definitions. Out-of-canton commuters have been even more responsive: their number increased by 1/3 relative to pre-reform levels when compared to the control group, and the estimated elasitcity is 8.7. This makes sense: moving further away and having a larger commute (or not leaving Obwalden despite a long commute) are costs individuals should be more willing to incur if in turn they can save on taxes. As in Table 4, I use heteroskedasticity robust standard errors and the elasticity estimates are statistically significant at the 1% level. For self-employed and retirees, the elasticities are negative. Here the parallel trends assumption, however, does not hold.

Plausibilty of the Large Elasticities. While these elasticites may seem very large, they are plausible given the institutional and geographical context under which they

are observed. First, the regressive income tax reform was extremely salient, as it was controversially discussed and eventually even taken to the courts. Salient and large changes in tax rates are more likely to induce large behavioral responses.

Second, the results show that in a model world à la Tiebout (1956), where institutional restrictions on voting with one's feet are absent, location responses of high earners are large—even when not focusing on specific professionals facing a global labor market like football players (Kleven et al., 2013, who report an elasticity of 1.8) or star scientists (Akcigit et al., 2016, who report an elasticity of 3). As highlighted by Kleven et al. (2019) and Schmidheiny and Slotwinski (2018), estimates are likely to be strongly affected by the institutional setting. Whether taxation is purely residence-based (as it is the case in Switzerland), or whether taxation is source-based (like in the U.S. and many European countries), heavily influences the migration response to taxation.

Third, results reported in the literature indicate that within-country elasticities are larger than in the international context studied by Kleven et al. (2013, 2014) and Akcigit et al. (2016). Agrawal and Foremny (2019), for example, find a flow elasticity with respect to the net-of-tax rate of 1.7 within Spain.[25] Schmidheiny and Slotwinski (2018), find even larger, albeit imprecisely estimated mobility elasticites for foreigners within Switzerland. They report a stock elasticity of 22.3, with a 95% confidence interval of 1.98–45.86, and a flow elasticity of 26.9, with a confidence interval of 7.2–65.9. My estimates therefore lie precisely at the lower end of their 95% confidence interval.

One reason for higher within-country elasticities lies in lower moving costs when relocating from one municipality or one canton to another, as compared to moving between countries (or over large distances). Moving costs likely increase in moving distance, such that they are smaller within smaller countries or regions. In addition, there is also a mechanical effect related to size: the magnitude of the elasticity has to be understood in the context of the size of the migration flows (number of top earners) prior to a

[25]The results in Moretti and Wilson (2017), who report a mobility elasticity of 1.6 for star scientists within the U.S., are not directly comparable, as they refer to the marginal tax rate. For moving decisions, what matters is the total tax burden, hence the average tax.

tax reform. Starting from a situation with low spatial mobility (or a small number of high-income residents), even a small increase in the number of in-movers (high-income residents) corresponds to a large relative change, which in turn implies a larger elasticity.

Compared to results obtained in other settings, my findings should therefore be thought of as observed migration elasticities when frictions are largely absent, i.e., with low moving costs, short distances, and an institutional setting designed to vote with one's feet.

4.3 Revenue Effects

The reform did increase the tax base, but what were the effects on the canton's revenue? To analyze the effect of the reform on cantonal tax revenue, I use the cantonal revenue statistics covering the period 1990–2014.[26] Panel a) in Figure 8 shows the evolution of cantonal income and wealth tax revenue in Obwalden in millions of CHF (right scale) and its share in cantonal income and wealth tax revenue collected in all Swiss cantons (left scale). Personal tax revenue dropped slightly after the reform but picked up again after 2008 and has surpassed pre-reform levels. The share in cantonal tax revenue, however, fell sharply after 2005 and has remained below pre-reform levels (with the exception of 2015, see Footnote 20). The drop in corporate income tax revenue (Panel b) of Figure 8) was even more substantial, both in absolute and relative terms. Total revenue (Panel c) of Figure 8), which includes all types of fiscal incomes as well as transfers from other cantons and the federation, clearly stagnated after the reform. As a consequence, Obwalden's share in total government income collected across all cantons fell from 0.39% in 2005 to 0.36% in 2016. This includes the reduction in transfers from the fiscal equalization scheme, which takes into account the share of high-income taxpayers and hence the resource potential in a canton.

[26]Finanzstatistik der Kantone, including cantonal and municipal tax revenues, available online from the Federal Finance Administration: http://www.efv.admin.ch. Results are robust to using only cantonal tax revenue.

Event Study Estimates. Figure 9 shows event studies described in Equation (2) for the effect of the reform on revenue from all personal tax, income taxes, and wealth taxes, respectively, per person.[27] I account for potential pre-existing trends prior to the reform following Freyaldenhoven et al. (2019, 2021b) , as described in Section 4.1. Even with this correction for pre-trends, I do not find a positive effect on income tax revenue. Wealth tax revenue dropped substantially compared to other cantons (and expressed relative to 2005). The estimated reduction corresponds to a loss of 17% in wealth tax revenue per person. The reduction was particularly strong in the first three years after the tax cuts. Only after 2008 we see a slight recovery of tax revenue relative to all other cantons. Overall personal tax revenue fell as a result. Only after 2014 the negative effects faded—thanks to recovering income tax revenue.

Altogether this analysis shows that the 2006 and 2008 tax reforms did not increase revenue in the medium run. In the presence of economies of scale in providing public goods, e.g., schools and roads, taxpayers in Obwalden could still be better off in a new equilibrium with larger population and lower tax payments per capita. Kellermann (2007), however, finds that large cantons (in terms of population) also have larger expenditures per capita, even after controlling for structural factors. She finds an overall population elasticity of 0.14, such that doubling the population increases expenditures per capita by 14%. This speaks against the economies of scale argument.

Mechanical Revenue Effects and Laffer Rate. AS an alternative approach, Table 6 shows a simple accounting exercise. The table shows the gains due to new taxpayers attracted and revenue losses on residents.[28] Net revenue losses were especially large on high-income taxpayers already residing in Obwalden. Obwalden benefited from inflows of middle-class households after the 2008 flat rate tax reform, which somewhat helped compensate the losses. The analysis also shows that in the first five years after the reform, the reduced wealth tax accounted for most of the net revenue losses, both among the rich

[27]Population data: Swiss Federal Statistical Office, BFS.

[28]The cantonal income tax data from Obwalden does not contain tax payments. I calculate the tax burden for each individual based on rate-determining and taxable income.

as well as the non-rich taxpayers. The net effect from the income tax was slightly positive. This was achieved thanks to the inflow of non-high-income taxpayers.

A simple estimate of the revenue-maximizing tax rate—corresponding to the maximum of the Laffer curve—suggests that Obwalden was not on the wrong side of the Laffer curve prior to the reform (where tax reductions increase tax revenue thanks to behavioral responses to less distortive taxation). For the top bracket, Piketty and Saez (2013) show that the revenue-maximizing top rate can be expressed in terms of the elasticity of taxable income (ETI), e, the alpha parameter from the Pareto distribution, a, and the elasticity of the stock of high-income taxpayers, η^S:

$$\tau^* = \frac{1}{(1 + a \cdot e + \eta^S)} \tag{6}$$

In the case at hand, $a = 1.74$ (the average value in Switzerland for the period 2000–2010 and the value in Obwalden in 2005, see Föllmi and Martínez, 2017). Assuming an ETI $e = 0.25$—a reasonable assumption following the literature reviewed in Saez et al. (2012) and the meta-analysis by Neisser (2018)—and abstracting from migration effects, (6) yields an estimate for τ^* of 69.7%. Taking into account the large migration elasticity $\eta^S = 2$, the optimal rate could be as low as 29.1%. However, given that the top rate was around 30% before 2006, revenue losses from the group of high-income taxpayers could be expected after further reductions of the tax rate.

The empirical finding that Obwalden was not on the wrong side of the Laffer curve is in line with the theoretical analysis by Keen and Kotsogiannis (2003). If the Federal and local government collude to set efficient taxes, they will end up on the upward-sloping side of the Laffer-curve.[29] However, the finding is interesting from a political economy perspective, as Laffer effects and the need to keep up with tax competition are one of the reasons put forward in favor of reducing cantonal taxes in Switzerland (see, e.g., Brülhart and Parchet, 2014). Empirical evidence from other countries on Laffer effects remains

[29]The theoretical literature (e.g., Milligan and Smart, 2019) has shown that a vertical tax structure with overlapping tax bases and revenue sharing mechanisms like the ones in place in Switzerland can be welfare improving (Köthenbürger, 2002; Keen and Kotsogiannis, 2003).

scarce. Agrawal and Foremny (2019) show that the Spanish Province of Madrid lost revenue when cutting its top marginal income tax rate to attract top earners—despite successfully triggering large inflows of high-income taxpayers from other provinces.

Another reason why Obwalden likely was not able to significantly increase tax revenue despite attracting high-income taxpayers is that many of those with rate-determining income above the regressive threshold had substantially lower taxable income (see Table 3). Stated differently: some of the top earners who moved there did not necessarily increase the tax base by their total earnings but rather to a smaller amount.

Due to the inflow of high-income taxpayers, the tax base rose enough to substantially reduce transfers Obwalden used to receive from the inter-cantonal fiscal equalization scheme NFA. The scheme is based on a canton's resource potential, defined by the tax base, and not on actual tax revenue, thereby limiting incentives for a race-to-the-bottom tax competition. While in 2008—the year of the introduction of the new fiscal equalization scheme—Obwalden recieved 62.4 million CHF (1,890 CHF per capita), in 2016 the amount had fallen to 22.3 million CHF (622 CHF per capita). In 2019, Obwalden had to start contributing towards the scheme. This indirect effect of the tax reduction therefore hurt the financial situation on top of any direct, mechanical tax revenue losses.

4.4 Employment Effects

If high-income taxpayers are more likely to start businesses which create jobs, attracting them at the expense of foregone tax revenue may pay off in form of higher economic activity and employment in the canton. Local employment indeed increased: between 2005 and 2008, the number of full-time equivalent (FTE) jobs rose by 11%—compared to a 4.3% increase in all Switzerland over the same period. This is even more remarkable as the total number of FTE jobs had been constant in Obwalden between 1995 and 2005.

Unfortunately, it is not possible to isolate the effect of the personal income tax reform on job creation, because in 2006, Obwalden also substantially reduced its corporate tax rates to a uniform rate of 6.6%, the lowest in the country at the time. The following

analysis therefore can only be interpreted as evidence of the effect of Obwalden's overall tax strategy including both, personal and corporate taxes, on job creation in the canton.

Figure 10 shows the corresponding event study estimates for the number of jobs and the number of FTE jobs per 1,000 inhabitants. The estimates suggest an impact in the first years after the reform, which fades out over time. This pattern suggests that the tax reforms led to a temporary boost and fostered structural change in a prior underdeveloped region. The corresponding DiD-estimates over the 2006–2016 period are 13 for total jobs per capita, and 16.6 for FTE jobs per capita, respectively. Compared to the 2005 baseline, this implies an increase in the number of jobs per capita of 2.3% and of 4% for the number of FTE jobs per capita (raw series and trends in levels for Obwalden and Switzerland reported in Appendix Figure A9).

A closer look into the jobs created (Table 7) shows that the strongest increase took place in (i) professional, high-skill activities, (ii) activities related to increased real estate demand and population growth, and (iii) low-skill services. The strong growth in high-skill professional jobs is partly explained by their low initial share in Obwalden's economy compared to the rest of Switzerland (last two columns of Table 7). At least in the short term, construction and real estate activities benefited from the demand from new taxpayers who moved to Obwalden. New taxpayers also increased aggregate demand for retail and hospitality services in the canton. These changes were significantly stronger in Obwalden than in the rest of Switzerland and surrounding cantons. While Obwalden had not suffered from high unemployment, the reform seems to have supported structural change towards a more high-skilled economy, reducing the relative importance of manufacturing and agriculture. However, part of this success likely needs to be attributed to the reduction in cantonal corporate income tax in 2006. I leave the effect of corporate taxes on local employment for future research.

5 Conclusion

Theory tells us that small regions can expect to gain from engaging in tax competition for high-income taxpayers. Indeed, most tax havens are small countries or regions within federal states. How large these gains are in practice, remains an empirical question, and the answer may vary depending on the institutional context.

I analyze a large local tax reform in Switzerland to measure how responsive top earners are to income taxes when it comes to their location choice. In 2006, Obwalden adopted an aggressive tax strategy with the goal to attract high-income taxpayers. I find that the reform was successful in attracting high-income taxpayers and in increasing Obwalden's tax base. Compared to other cantons, within ten years the share of top earners in Obwalden doubled, and net income per taxpayer increased by 17% in response to the reform. Using individual-level tax data from Obwalden, I identify a large in-flow elasticity with respect to the net-of-average-tax rate of up to 7.2 over the first five years. The more precisely identified elasticity of the stock of high-income taxpayers living in the canton (which also accounts for residents who stayed but would otherwise have moved elsewhere), lies in the range of 1.5-2.

These large elasticities reflect the institutional features under which they arise. In the studied context, (i) taxation is purely residence based, and people can "vote with their feet" (Tiebout, 1956) by freely relocating across jurisdictions within the country, (ii) tax changes were large and very salient, (iii) moving distances are short and hence moving costs are low, iv) the share of top earners in and the inflow of high-income taxpayers to Obwalden were very low prior to the reform. Compared to results obtained in other countries with different settings, my findings should therefore be thought of as observed migration elasticities when major frictions are largely absent. These factors help explain and benchmark the elasticity estimates.

Although the reform was successful at attracting high-income taxpayers, DiD estimates of the change in cantonal tax revenue show that the reform did not increase revenue. This raises an important question: what do jurisdictions gain from tax com-

petition if not tax revenue? Potential positive externalities arising from tax competition for high-income taxpayers have so far not been addressed in empirical work. A larger share of top earners could, for example, promote local job creation and structural change. DiD results indeed suggest a temporary increase of 2.3-4% in cantonal employment. Job growth took place in high-skill professional jobs, low skill service jobs, and construction and real estate services. However, this effect on job creation may have been driven by the simultaneous reduction of the corporate income tax.

Compliance with Ethical Standards

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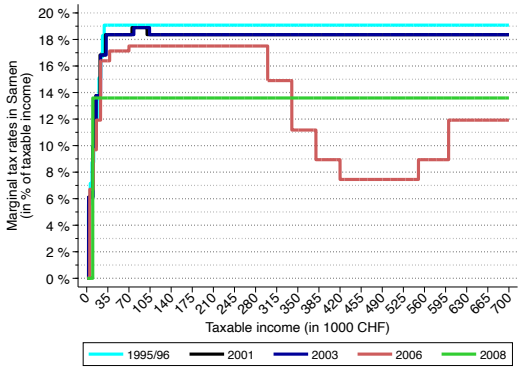
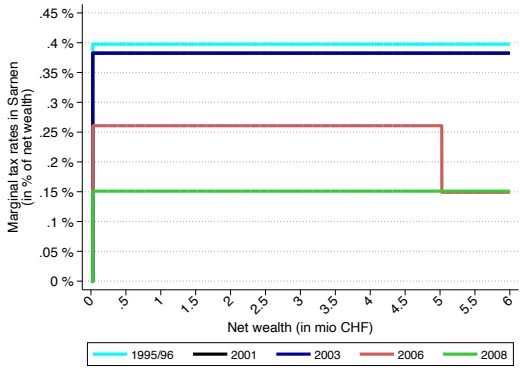
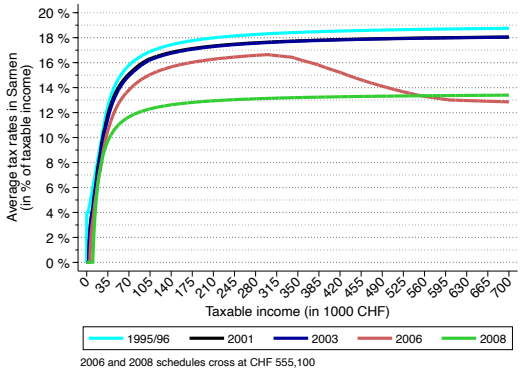
Tables and Figures



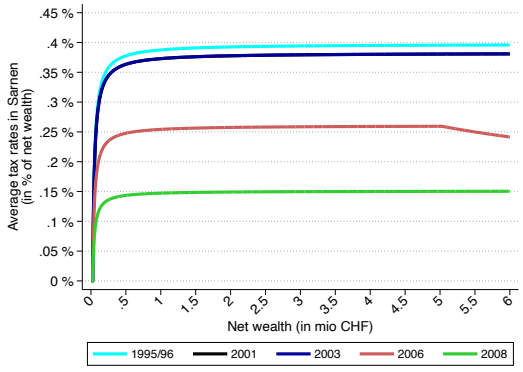
(a) Statutory marginal income tax rates



(b) Statutory marginal wealth tax rates



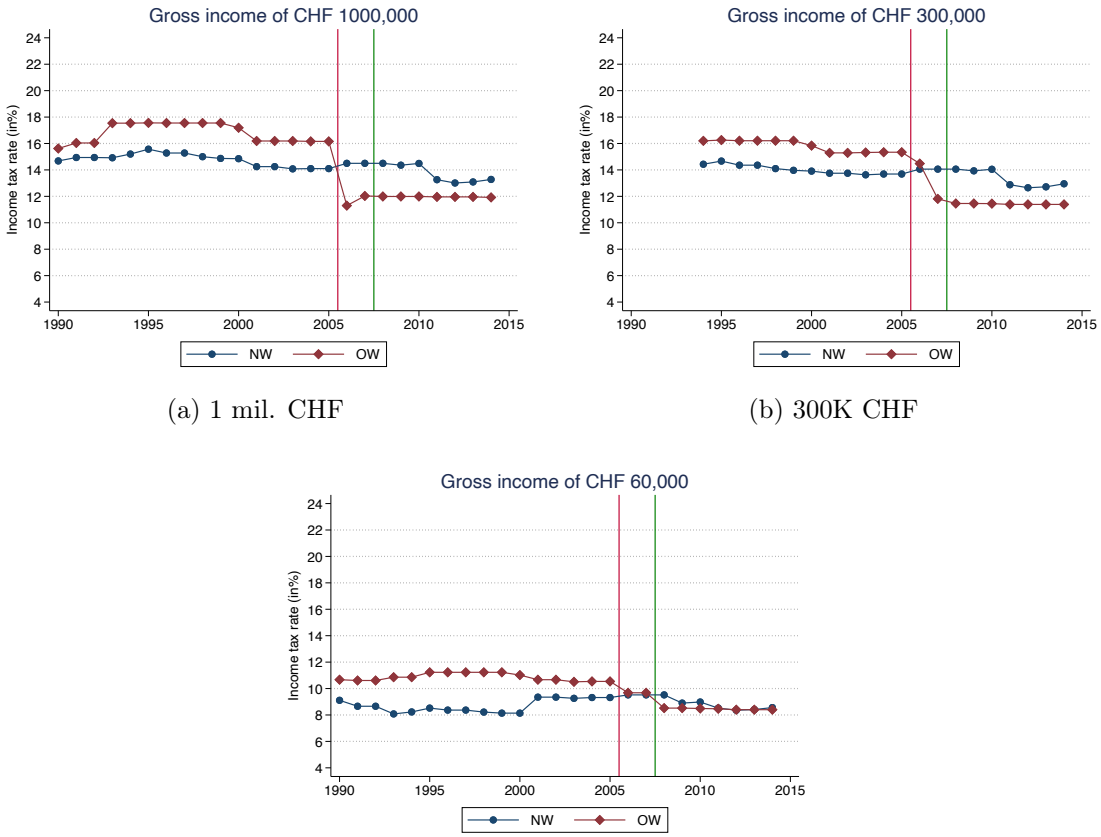
(c) Statutory average income tax rates



(d) Statutory average wealth tax rates

Figure 1: Statutory income and wealth tax rates after different cantonal tax reforms

Note: The figure shows statutory marginal tax rates (Panels a) and b) and average tax rates (Panels c(and d) on income (left column) and wealth (right column), respectively, for a single taxpayer after different tax reforms in the canton of Obwalden. The income tax rats are expressed in percent of taxable income, wealth taxes are in percent of net wealth. Statutory tax rates are computed based on the tax law, which defines the marginal rates. Since the tax level (but not the schedule itself) further varies by municipality through a tax multiplier, the graphs show tax rates for the municipality of Sarnen, the main town in the canton. Between 1995 and 2003, the income tax was only slightly adjusted for bracket creep; the wealth tax schedule remained unchanged. Small differences over these years stem from changes in the municipality multiplier (all multipliers reported in Figure A2). See text for details. *Source*: Own calculations based on cantonal tax laws.



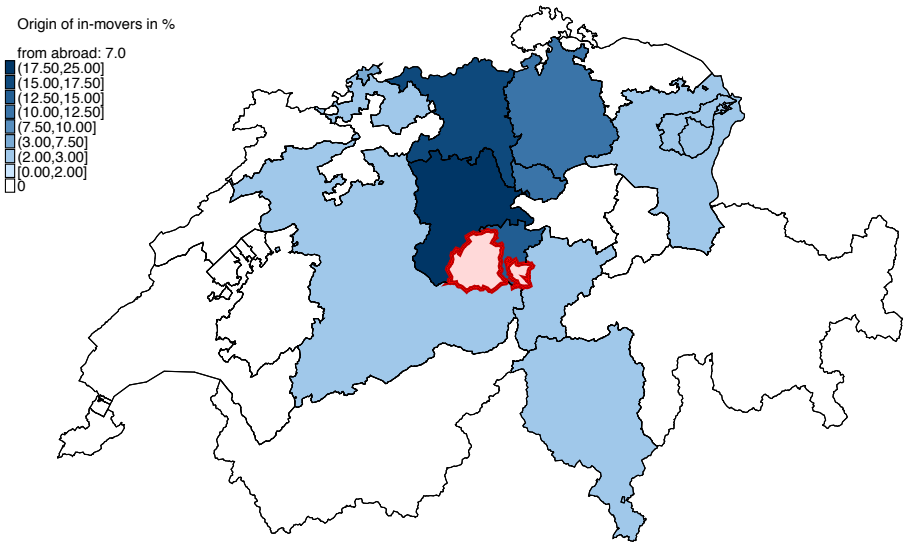
(a) 1 mil. CHF

(b) 300K CHF

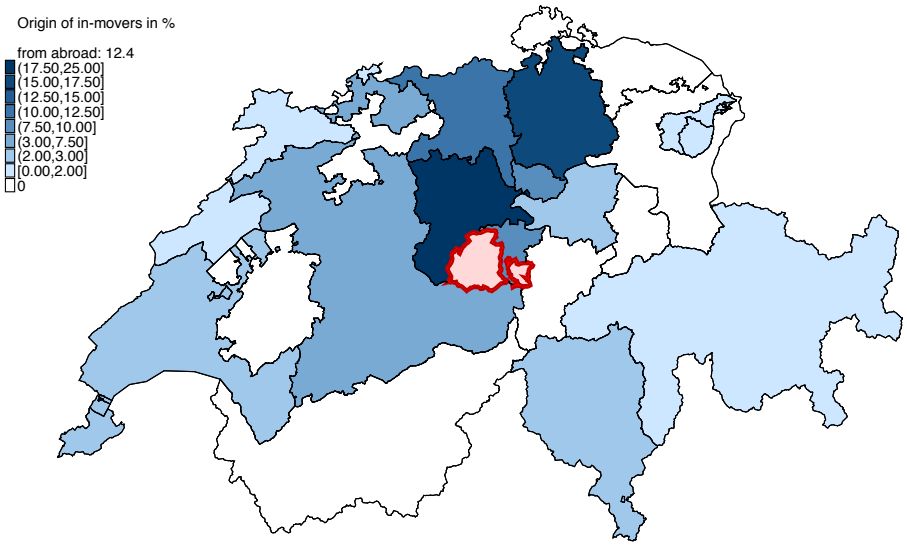
(c) 60K CHF

Figure 2: Beggar-Thy-Neighbor: average income tax rates in Obwalden and Nidwalden

Note: Estimated effective average tax rates on gross income from employment for a single taxpayer with no children, as published by the Federal Tax Administration ESTV, Bern. Calculations are based upon the assumption that all income is income from employment. Based on this assumption, the following mandatory social security deductions from gross labor income are taken into account: 5.05% social security and disability insurance; 1.00% unemployment insurance; 5.00% occupational pension (whereby this rate is a simple assumption, as in practice the rate varies substantially with age and firms). In addition, a canton-specific deduction for insurance premiums such as health and accident insurance and savings interest, and a canton-specific deduction for work-related expenses is applied. Tax rates refer to the average canton and municipality tax in the main town of each canton, i.e., Sarnen in Obwalden and Stans in Nidwalden. Appendix Figure A10 further shows the tax burden for high incomes in each municipality in Obwalden and the 50 cheapest municipalities in Switzerland (out of approx. 2,500), respectively, in 2005, 2006, and 2008.



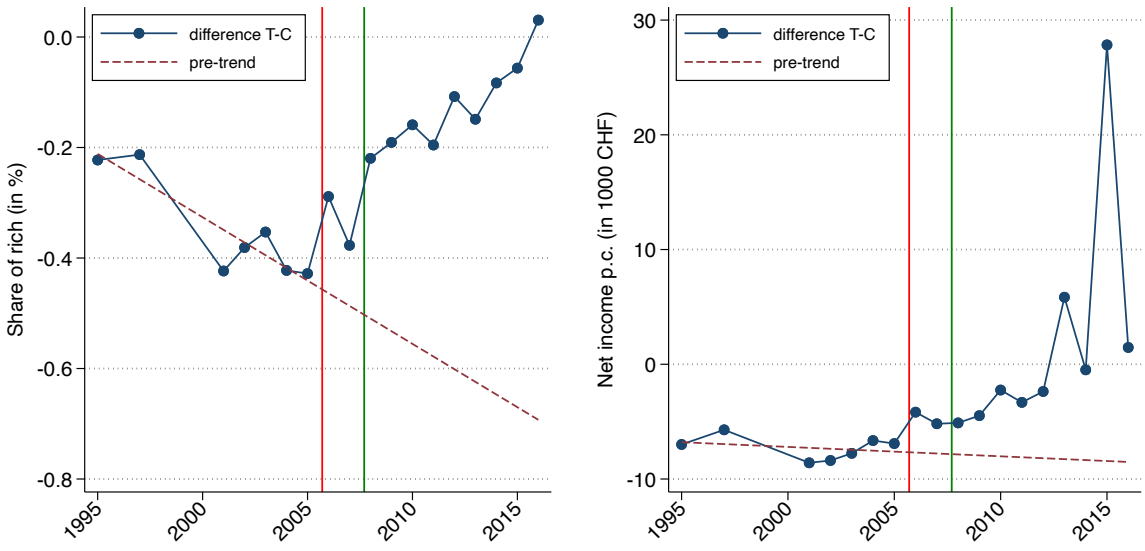
(a) Pre-reform (2001-2005)



(b) Post-reform (2006-2010)

Figure 3: Origin of high-income taxpayers who moved to Obwalden

Note: The figure shows the origin of high-income taxpayers in percent of all high-income in-movers with income > 300K CHF pooled over the pre-reform period (top Panel a) and the post-reform period (bottom Panel b). After the reform, high-income taxpayers who moved to Obwalden came from further away than before. A majority still moved-in from Lucerne (19%), the largest neighboring canton, followed by large cantons (in terms of total Swiss population) like Zurich (15%) and Aargau (11%). After 2006 also taxpayers from more distant cantons—especially the high-tax french-speaking cantons—and from abroad moved to Obwalden. *Source*: Personal income and wealth tax data Obwalden, 2001–2010.

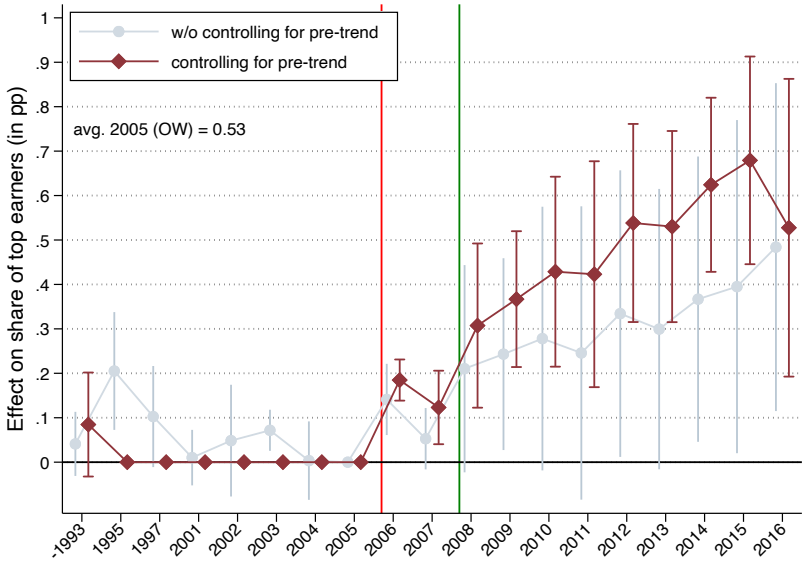


(a) Share of top earners

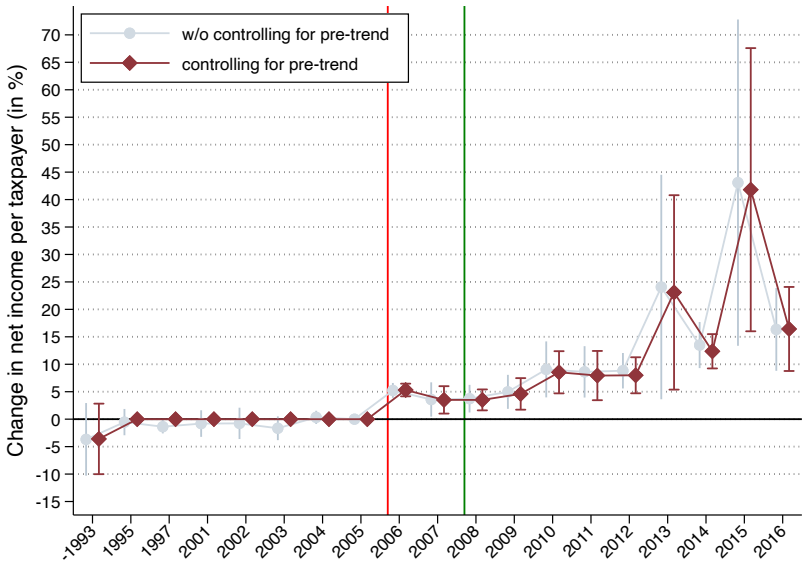
(b) Income per taxpayer

Figure 4: Trends in Obwalden's tax base compared to the rest of Switzerland

Note: The Figure shows how Obwalden's tax base has evolved compared to other cantons. Panel a) shows the trends in the difference of the share of high-income taxpayers–i.e., those with federal taxable income $>$ 300K CHF–in Obwalden and all other Swiss cantons. Panel b) shows the evolution of the difference in net income per taxpayer in Obwalden compared to all other cantons. The averages for both, the treatment group Obwalden, and the rest of Switzerland, which constitutes the control group, are based on population weighted averages of municipality values of the share of top earners and income per taxpayer, respectively, holding the population fixed after 2005. The red line in 2006 marks the introduction of the regressive schedule, in 2008 (green line) the flat rate tax came into place. *Source*: individual federal income tax data, ESTV Bern.



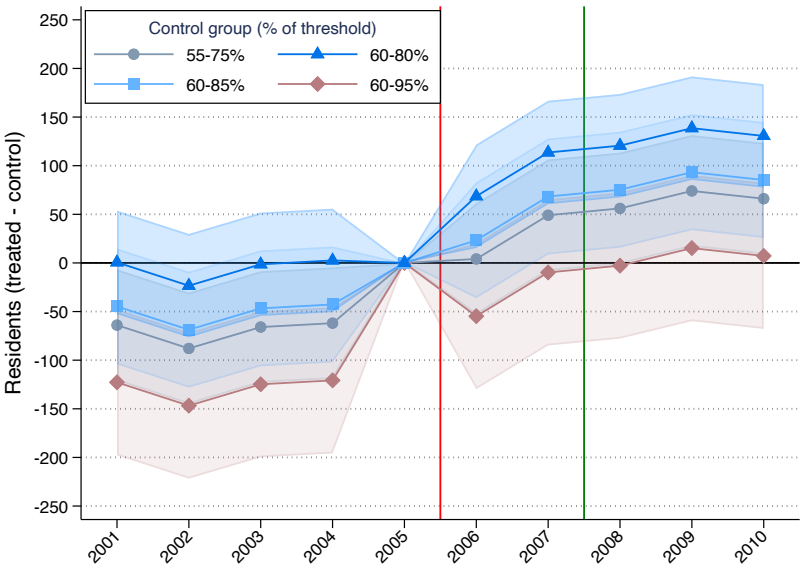
(a) Share of top earners



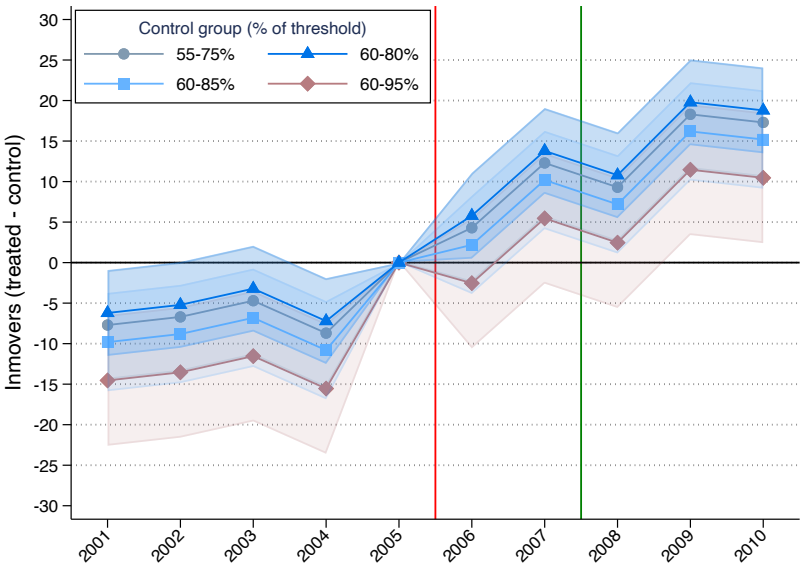
(b) Income per taxpayer

Figure 5: Event study estimates of the effect on Obwalden's tax base

Note: This figure shows estimates of the effects of the tax reform on the share of top earners in Obwalden (Panel a) and on income per taxpayer in Obwalden (Panel b) compared to the rest of Switzerland. Event study estimates computed using the *xtevent* package in Stata, accounting for potential pre-trends using the 'trend' option therein (see Freyaldenhoven et al., 2021b, and Freyaldenhoven et al., 2021a). As the underlying unit of observation for the estimates are municipalities, the regressions are weighted by the number of taxpayers in each municipality (holding the weights fixed after 2005). All regressions include canton and time fixed effects. Note that prior to 2001, tax data does not exist for every year (see Martinez et al., 2020, for details), which is why only estimates for 1995 and 1997 are available. Estimates in Panel b) are rescaled relative to average income per taxpayer in OW in 2005, hence the shown estimates are percentage changes. In Panel b) the data is further top winsorized at the 99th percentile. This reduces the effect of some large outliers in 2015. The red line in 2006 marks the introduction of the regressive schedule, in 2008 (green line) the flat rate tax came into place. The vertical bars represent 95% confidence intervals. Standard errors are clustered by canton-year and by municipality. *Source*: Individual federal income tax data, ESTV Bern.



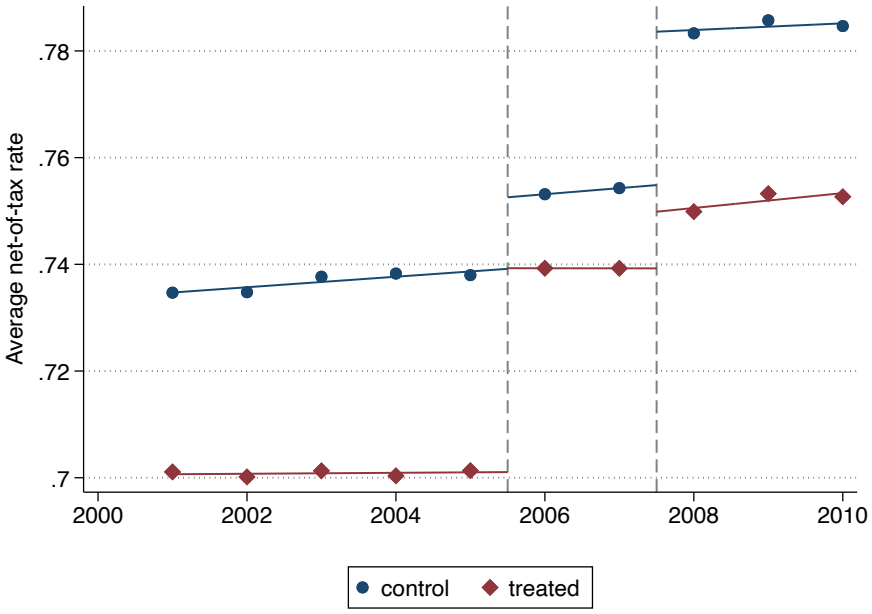
(a) Stock (all residents)



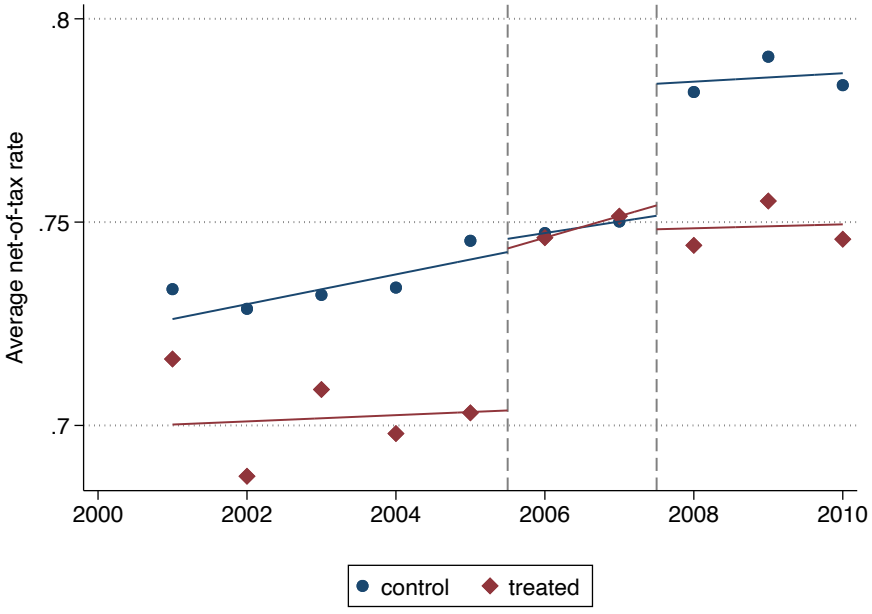
(b) Inflow (new in-movers)

Figure 6: Event studies of number of taxpayers for different control groups, 2001–2010

Note: The figure shows estimates of the effect of the tax reform on the number of top earners (Panel a) and on the annual inflow of high-income taxpayers (Panel b) using different control groups. The control group is always defined as having rate-determining income of a specified fraction of the regressive threshold of 300K CHF. For example, the 60%–80% control group includes taxpayers with income in the range of 180K–240K CHF. The treatment group is always defined as taxpayers with income above the threshold of 300K CHF. The red line in 2006 marks the introduction of the regressive schedule, in 2008 (green line) the flat rate tax came into place. 95% heteroskedasticity-robust confidence intervals. *Source*: Personal income and wealth tax data Obwalden, 2001–2010.



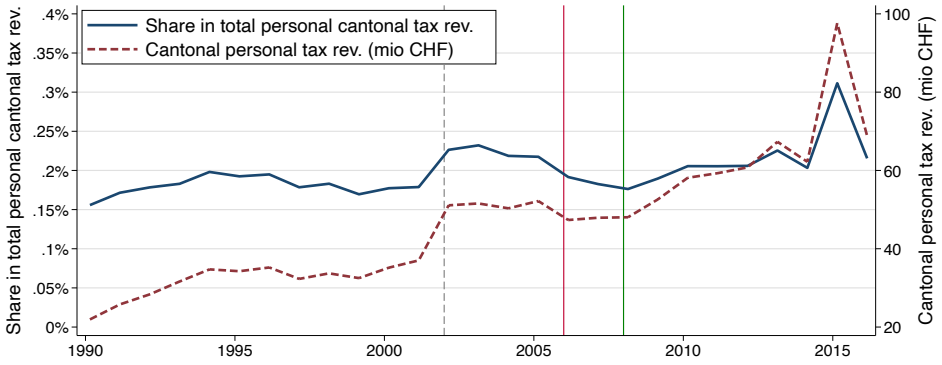
(a) Residents



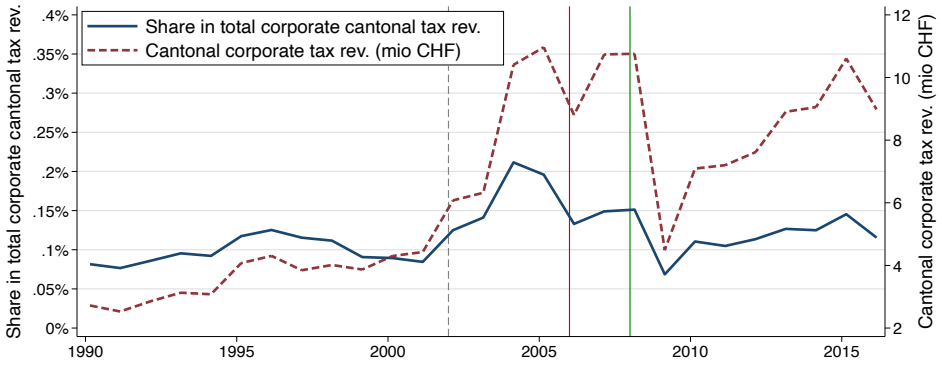
(b) In-movers

Figure 7: Net-of-average-tax rates in control and treatment groups, 2001–2010

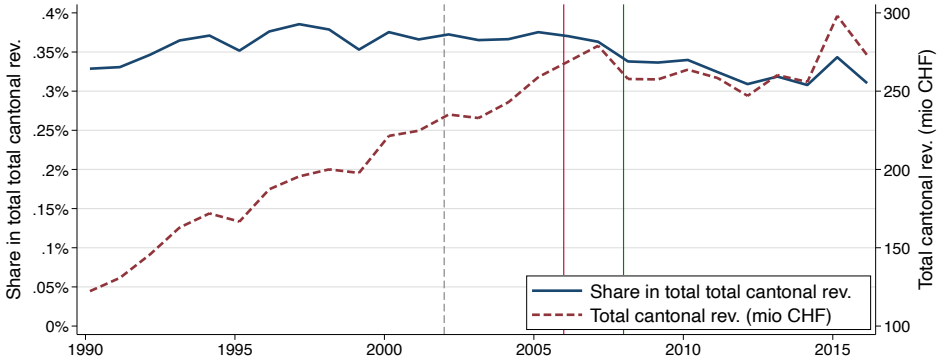
Note: The figure shows binned scatter plots of the net-of-average-tax rate $(1 - \bar{\tau})$ (including federal, cantonal, and municipal taxes) of the treatment and control group for residents (top Panel a) and in-movers (bottom Panel b). The control group is defined as having rate-determining income of 60–80% of the regressive threshold of 300K CHF, i.e., 180K–240K CHF. The treatment group is always defined as taxpayers with income above the threshold of 300K CHF. Regression discontinuities in 2005 and 2008 mark the pre-treatment period (2001-2005), the period with the regressive scheme (2006-2007), and the period with the flat rate tax (2008-2010), respectively. The remaining difference in $(1 - \bar{\tau})$ after introduction of the flat rate tax in 2008 stems from the progressive federal tax. *Source*: Personal income and wealth tax data canton Obwalden, 2001–2010.



(a) Personal income and wealth tax revenue



(b) Corporate tax revenue



(c) Total revenue

Figure 8: Evolution of tax revenue in Obwalden

Note: The figure shows the evolution of personal tax revenue (Panel a), corporate tax revenue (Panel b), and total revenue including all fiscal incomes and transfers (Panel c) in Obwalden. The solid blue line shows Obwalden's share relative to the respective revenue sum over all cantons in percent (left axis). The dashed red line shows the respective revenue raised in Obwalden in millions of CHF (left axis). The increase in personal tax revenue in 2015 stems from a large, one-time increase in personal income tax collections in the municipality of Sarnen, likely stemming from an IPO or the sale of a large, privately owned business. The red line in 2006 marks the introduction of the regressive schedule, in 2008 (green line) the flat rate tax came into place; the grey dotted line marks the introduction of the Agreement on Free Movement of People (AFMP) with the EU. *Source*: Finanzstatistik der Kantone, EFV.

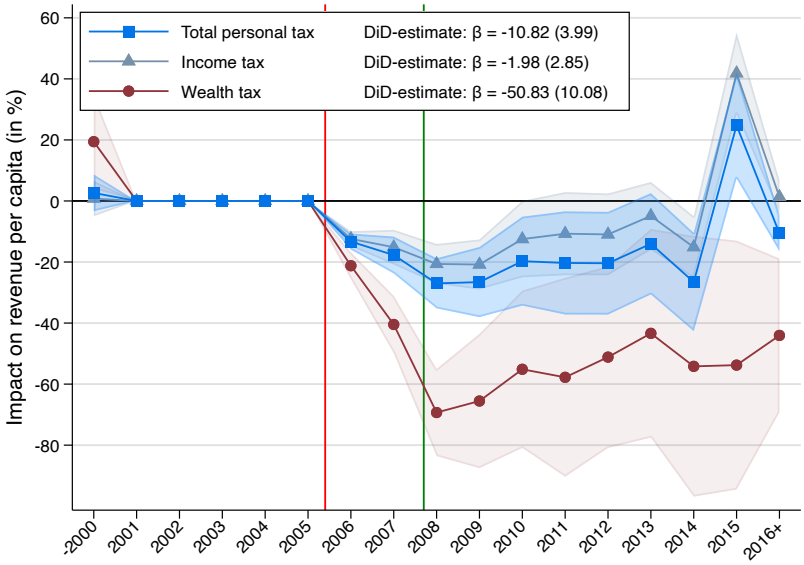


Figure 9: DiD estimates of cantonal tax revenue

Note: The figure shows event studies of the income, wealth, and total personal tax revenue per capita, respectively. I compute the dynamic event study estimates using the *xtevent* package in Stata, and account for potential pre-trends using the 'trend' option therein (see Freyaldenhoven et al., 2021b, and Freyaldenhoven et al., 2021a). All specifications include year and canton fixed effects and are weighted by population size using analytic weights (holding the weights constant at the 2005 level in the post-treatment period). Coefficients are transformed to percentage changes relative to the level in 2005. Standard errors are clustered two-way, at the canton and at the year level, and are transformed using the delta method. The shaded areas represent 95% confidence intervals. Reported DiD estimates capture the average post reform effect. The red line in 2006 marks the introduction of the regressive schedule, in 2008 (green line) the flat rate tax came into place. *Source*: Finanzstatistik der Kantone, EFV.

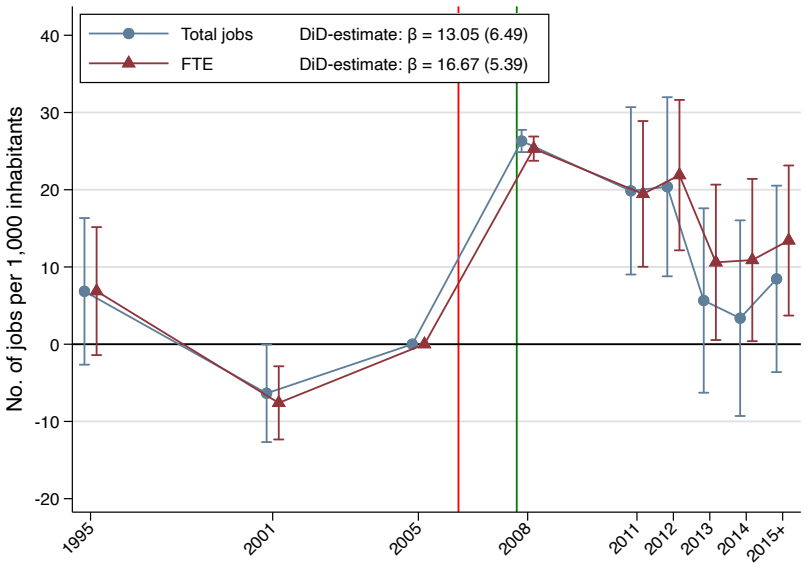


Figure 10: Event study of FTE and jobs per capita in Obwalden

Note: The figure shows event studies of the total number of jobs and the number of full-time equivalent (FTE) jobs per 1,000 inhabitants in Obwalden compared to all other Swiss cantons. The specification—estimated with the *xtevent* package in Stata (see Freyaldenhoven et al., 2021b, and Freyaldenhoven et al., 2021a)—includes year and canton fixed effects. The vertical bars represent 95% confidence intervals from two-way clustered standard errors, clustered at the canton and year levels. Reported coefficients are from a corresponding Difference-in-Differences (DiD) regression. The red line marks the introduction of the regressive schedule in 2006, in 2008 (green line) the flat rate tax came into place. Data used for the estimation comes from Betriebszählung (BZ, 1995–2008) and Statistik der Unternehmensstruktur (STATENT, 2005–2016). These two data sources (available online from BFS) differ in levels but exhibit almost identical growth rates in the overlapping period 2005–2008. I extrapolate the STATENT data backwards based on growth rates obtained from the BZ series. *Source*: STATENT and BZ, BFS.

Table 1: DiD estimates of share of top earners in the canton

	(1) baseline	(2) pre-trend correction
	Panel A: Municipality level	
DiD	0.216	0.369*
2-way cluster SE	[0.15]	[0.15]
N	45412	45412
R^2	0.94	0.94
Canton-Year clusters	453	453
Municipality clusters	2911	2911
	Panel B: Canton level	
DiD	0.219***	0.361***
2-way cluster SE	[0.05]	[0.02]
N	459	459
R^2	0.94	0.83
Canton clusters	26	26
Year clusters	18	18
	Panel C: Treatment group level	
DiD	0.202*	0.277**
	(0.07)	(0.07)
N	36	36
R^2	1.00	1.00
$\overline{Y}_{t<2006}$	0.531	0.531

*** p<0.01, ** p<0.05, * p<0.1. *Note*: The table presents difference-in-differences estimates of the effect of Obwalden's tax reform on the share of taxpayers with real incomes > 300K relative to all other cantons, as specified in Equation (1). In Panel A the unit of analysis is the municipality. In Panel B the unit of analysis is the canton. In Panel C, the unit of analysis is the treatment group level, i.e., Obwalden compared to the average of all other cantons which together form the control group. Two-way clustered standard errors shown in brackets (Panels A and B). In Panel C, heteroskedasticity robust standard errors are reported in parentheses. Column 1 shows the baseline estimates. In Column 2 the outcome variable is corrected for pre-existing trends (see text for details). $\overline{Y}_{t<2006}$ denotes the average share of top earners in Obwalden prior to the reform (in percent). All regressions include year fixed effects and unit (i.e., municipality or canton) fixed effects and are weighted by population size using analytic weights (holding the weights constant at the 2005 level in the post-treatment period). Years covered in the analysis: 1995–2016 (with gaps between 1995 and 2001). *Source*: Individual federal income tax data, ESTV Bern.

Table 2: DiD estimates of income per taxpayer

	(1) baseline	(2) pre-trend correction	(3) sample: <300K	(4) sample: >300K	(5) controls (cells)
	Panel A: Municipality level				
DiD	7.37**	7.25**	3.34***	274.62	2.08
2-way cluster SE	[2.52]	[2.52]	[0.56]	[178.52]	[1.58]
N	45412	45412	45412	33790	592970
R^2	0.95	0.94	0.95	0.45	0.81
Canton-Year clusters	453	453	453	453	453
Municipality clusters	2911	2911	2911	2350	2942
	Panel B: Canton level				
DiD	7.21***	7.10***	3.30***	216.74***	2.06*
2-way cluster SE	[0.51]	[0.43]	[0.19]	[17.39]	[0.72]
N	459	459	459	459	7283
R^2	0.96	0.93	0.95	0.69	0.89
Canton clusters	26	26	26	26	26
Year clusters	18	18	18	18	18
	Panel C: Treatment group level				
DiD	7.15*	7.19*	3.44**	105.10	2.06
	(2.73)	(2.73)	(0.89)	(280.51)	(1.58)
N	36	36	36	36	577
R^2	0.99	0.99	1.00	0.61	0.98
$\overline{Y}_{t<2006}$	53.758	53.758	49.586	834.725	53.594

*** p<0.01, ** p<0.05, * p<0.1. *Note*: The table presents difference-in-differences estimates of the effect of Obwalden's tax reform on real income per taxpayer relative to all other cantons, as specified in Equation (1). The unit of analysis is the municipality in Panel A, and the canton in Panel B, respectively. In panel C, the unit of analysis is the treatment group level, i.e., Obwalen compared to the average of all other cantons which together form the control group. Data are top winsorized at the 99th percentile on an annual basis to correct for large outliers. Two-way clustered standard errors shown in brackets (Panels A and B). In Panel C, heteroskedasticity robust standard errors are reported in parentheses. Column 1 shows the baseline estimates. In Columns 2–5, the outcome variable is corrected for pre-existing trends (see text for details). The specification in Columns 3 and 4 shows results based on a sample including only the non-high-income and only the high-income taxpayers, respectively. In Column 5, cells are split into different binary characteristics of the taxpayers: married, single parents, married with children (reference category: single taxpayers with no dependents), and self-employed, non-working, retiree (reference category: employees). By splitting up the municipality-year cells into these categories, the number of observations increases. $\overline{Y}_{t<2006}$ denotes the average outcome in Obwalden prior to the reform (in real CHF). All regressions include year fixed effects and unit (i.e., municipality or canton) fixed effects and are weighted by population size using analytic weights (holding the weights constant at the 2005 level in the post-treatment period). Years covered in the analysis: 1995–2016 (with gaps between 1995 and 2001). *Source*: Individual federal income tax data, ESTV Bern.

Table 3: Characteristics of treatment and control groups, 2001–2010 (I/II)

	New in-coming taxpayers			**All taxpayers**		
	Treated	Control 60-80%	Rest	Treated	Control 60-80%	Rest
Tax burden in %						
Avg. NTR ($t < 2006$)	70.32	73.65	86.66	70.09	73.69	86.84
	(1.256)	(1.286)	(5.247)	(1.492)	(1.130)	(5.422)
Avg. NTR ($t \geq 2006^*$)	74.06	74.96	87.13	73.93	75.37	87.79
	(1.264)	(1.013)	(5.378)	(1.185)	(1.895)	(5.317)
Avg. wealth tax ($t < 2006$)	0.415	0.415	0.414	0.413	0.413	0.416
	(0.0160)	(0.0159)	(0.0377)	(0.0231)	(0.0203)	(0.0358)
Avg. wealth tax ($t \geq 2006^*$)	0.278	0.299	0.287	0.282	0.293	0.285
	(0.0546)	(0.0560)	(0.0218)	(0.0587)	(0.0379)	(0.0192)
Income (real, in 1000 CHF)						
Rate-determining	965.6	205.0	45.94	848.8	206.2	43.17
	(2660.1)	(16.82)	(45.97)	(1730.8)	(18.12)	(38.57)
Taxable	217.6	60.92	28.07	242.5	80.02	35.32
	(536.4)	(80.82)	(31.37)	(1159.0)	(93.17)	(31.35)
Wealth (real, in 10,000 CHF)						
Rate-determining	1103.4	134.2	28.34	1616.7	224.6	25.83
	(2810.9)	(244.6)	(164.9)	(6269.2)	(349.8)	(121.2)
Taxable	418.1	51.06	13.18	347.4	73.55	13.84
	(1773.8)	(214.2)	(146.1)	(1581.5)	(209.6)	(65.50)
Employment status						
Employee	0.637	0.740	0.786	0.516	0.546	0.608
	(0.482)	(0.440)	(0.410)	(0.500)	(0.498)	(0.488)
Self employed	0.0674	0.0611	0.0584	0.152	0.147	0.0564
	(0.251)	(0.240)	(0.235)	(0.359)	(0.354)	(0.231)
Retiree	0.0518	0.0687	0.0985	0.131	0.138	0.219
	(0.222)	(0.254)	(0.298)	(0.337)	(0.345)	(0.414)
Share of income from						
Emplyoment	0.455	0.590	0.691	0.317	0.440	0.586
	(0.394)	(0.369)	(0.993)	(0.349)	(0.378)	(0.691)
Self-employment	0.131	0.130	-1.833	0.185	0.144	0.0336
	(0.290)	(0.284)	(134.9)	(0.327)	(0.291)	(24.67)
Capital	0.440	0.262	1.434	0.484	0.347	0.130
	(0.441)	(0.300)	(94.54)	(0.389)	(0.315)	(19.83)
Transfers	0.0206	0.0452	0.164	0.0530	0.121	0.301
	(0.0879)	(0.173)	(0.393)	(0.150)	(0.277)	(6.335)
Observations	193	131	7358	3832	3175	229732

Note: The table reports sample means for taxpayers who are in the treatment group, control group (with an income of 60-80% of the regressive threshold), and remaining population of taxpayers. Means are reported separately for new incoming taxpayers (in which case the values refer to the year they first arrived in Obwalden) and the total stock of taxpayers, respectively. Standard deviations reported in parentheses. NTR: net-of-average-tax rate, $(1 - \bar{\tau})$. Transfers: these include government transfers, such as pensions or unemployment benefits, as well as transfers from other households, namely alimony payments. *2006–2007; afterwards, cantonal income and wealth tax rates are identical for everyone, due to the 2008 flat rate tax reform. *Source*: Personal income and wealth tax data canton Obwalden, 2001–2010.

Table 3: Characteristics of treatment and control groups, 2001–2010 (II/II)

	New in-coming taxpayers			**All taxpayers**		
	Treated	Control 60-80%	Rest	Treated	Control 60-80%	Rest
Household characteristics						
Female	0.0622	0.0611	0.363	0.0820	0.0829	0.311
	(0.242)	(0.240)	(0.481)	(0.274)	(0.276)	(0.463)
Age	52.08	49.47	42.82	59.67	57.03	48.13
	(10.86)	(11.16)	(16.02)	(12.60)	(12.62)	(19.93)
Married	0.767	0.756	0.424	0.772	0.763	0.456
	(0.424)	(0.431)	(0.494)	(0.420)	(0.426)	(0.498)
Double earners	0.430	0.458	0.144	0.421	0.480	0.206
	(0.496)	(0.500)	(0.351)	(0.494)	(0.500)	(0.404)
Nr. dependents	0.834	1	0.309	0.694	0.736	0.408
	(1.096)	(1.150)	(0.752)	(1.067)	(1.077)	(0.882)
Protestant	0.218	0.153	0.167	0.171	0.140	0.0861
	(0.414)	(0.361)	(0.373)	(0.376)	(0.347)	(0.280)
Swiss citizen	0.696	0.678	0.860	0.865	0.919	0.930
	(0.462)	(0.470)	(0.347)	(0.342)	(0.273)	(0.256)
Moved-in from abroad	0.115	0.120	0.135	0.130	0.0894	0.0639
	(0.320)	(0.326)	(0.342)	(0.337)	(0.285)	(0.245)
Expenditure-based taxation	0	0.00763	0.0416	0.00104	0.00157	0.0235
	(0)	(0.0874)	(0.200)	(0.0323)	(0.0397)	(0.152)
Weekend residents	0.0207	0.0305	0.0292	0.00600	0.00661	0.0169
	(0.143)	(0.173)	(0.168)	(0.0773)	(0.0811)	(0.129)
Tax savings from moving (real, in 1,000 CHF)						
Total	2591.1	-107.9	-161.2			
	(8946.3)	(539.7)	(184.4)			
Avg. annual savings	1661.0	-49.02	-155.9			
	(3363.6)	(510.5)	(321.4)			
Driving distance to former residence						
in km	84.21	65.77	61.85			
	(59.30)	(44.44)	(50.21)			
in minutes	67.62	54.75	53.69			
	(39.61)	(31.17)	(37.18)			
Observations	193	131	7358	3832	3175	229732

Note: The table reports sample means for taxpayers who are in the treatment group, control group (with an income of 60-80% of the regressive threshold), and remaining population of taxpayers. Means are reported separately for new incoming taxpayers (in which case the values refer to the year they first arrived in Obwalden) and the total stock of taxpayers, respectively. Standard deviations reported in parentheses.
Source: Personal income and wealth tax data canton Obwalden, 2001–2010.

Table 4: Elasticity estimates and number of high-income taxpayers in Obwalden

	(1) DiD (level)	(2) DiD (log)	(3) 2SLS (log)	(4) DiD (level)	(5) DiD (log)	(6) 2SLS (log)
Panel A: Stock of taxpayers						
Control group	*60-80%*			*60-95%*		
DiD_{2006}	31.20**	0.045		11.70	0.062*	
	(14.77)	(0.038)		(12.62)	(0.035)	
η^S (2006-07)			1.459*			2.011***
			(0.745)			(0.677)
1^{st} stage F			570.90***			1033.76***
η^S (2006-10)			1.492**			1.891***
			(0.742)			(0.671)
1^{st} stage F			464.84***			1435.60***
$\Delta\tau_{2006}$ (pp)	3.841			3.841		
$\overline{Y}_{t<2006}$	324.6	5.8		324.6	5.8	
Panel B: Flow of taxpayers						
Control group	*60-80%*			*55-75%*		
DiD_{2006}	8.40	0.291		9.60**	0.446**	
	(5.18)	(0.295)		(4.28)	(0.220)	
η^F (2006-07)			6.51*			9.98***
			(3.77)			(2.57)
1^{st} stage F			34.64***			21.98***
η^F (2006-10)			4.034			7.210***
			(3.377)			(2.626)
1^{st} stage F			361.59***			69.25***
$\Delta\tau_{2006}$ (pp)	4.605			4.605		
$\overline{Y}_{t<2006}$	9.6	2.3		9.6	2.3	

*** p<0.01, ** p<0.05, * p<0.1. *Note*: Regressions based on aggregate data at the year-group level. The dependent variable is the number of residents (Panel A) or in-movers (Panel B) in the treatment and control group, respectively. In Columns 1–3, the control group is defined as having rate-determining income of 180K–240K CHF, i.e. 60–80% of the regressive income threshold. Columns 4–6 are based on alternative definitions of the control group. In Panel A, the alternative control group is defined as having rate-determining income of 180K–285K CHF, i.e. 60–95% of the regressive income threshold (see Appendix Figure A11a). In Panel B, the alternative control group is defined as having rate-determining income of 165K–225K CHF, i.e. 55–75% of the regressive income threshold (see Appendix Figure A11b). $\Delta\tau_{2006}$ refers to the percentage point change in the tax rate due to the 2006 reform. $\overline{Y}_{t<2006}$ indicates the pre-treatment average of the outcome over the years 2001–2005 in the treatment group. Robust standard errors consistent with heteroskedasticity in parentheses (Huber/White/sandwich estimator of variance). *Source*: Personal income and wealth tax data Obwalden, 2001–2010.

Table 5: Heterogeneity analysis: stock elasticities by subgroup

	(1) DiD (level)	(2) DiD (log)	(3) 2SLS (log)	(4) DiD (level)	(5) DiD (log)	(6) 2SLS (log)
Panel A: Active in labor force						
Control group		*60-80%*			*60-95%*	
DiD_{2006}	50.50***	0.132***		36.40***	0.139***	
	(8.22)	(0.029)		(7.39)	(0.025)	
η^S (2006-10)			4.046***			4.175***
			(0.526)			(0.528)
1^{st} stage F			1302.26***			269.16***
$\Delta\tau_{2006}$ (pp)	3.797			3.797		
$\overline{Y}_{t<2006}$	268.2	5.6		268.2	5.6	
Panel B: Self-employed						
Control group		*60-80%*			*60-95%*	
DiD_{2006}	-8.60	-0.144		-9.80***	-0.209***	
	(5.61)	(0.117)		(3.28)	(0.062)	
η^S (2006-10)			-2.666			-4.707*
			(3.019)			(2.610)
1^{st} stage F			202.86***			150.09***
$\Delta\tau_{2006}$ (pp)	3.760			3.760		
$\overline{Y}_{t<2006}$	61.8	4.1		61.8	4.1	
Panel C: Commuters						
Control group		*60-80%*			*60-95%*	
DiD_{2006}	10.00***	0.278**		7.90*	0.284***	
	(3.80)	(0.121)		(4.25)	(0.106)	
η^S (2006-10)			8.736***			9.105***
			(2.402)			(2.346)
1^{st} stage F			251.35***			146.58***
$\Delta\tau_{2006}$ (pp)	3.830			3.830		
$\overline{Y}_{t<2006}$	29.2	3.4		29.2	3.4	
Panel D: Retirees						
Control group		*60-80%*			*60-95%*	
DiD_{2006}	-19.30**	-0.417***		-24.70***	-0.343**	
	(8.99)	(0.159)		(7.54)	(0.145)	
η^F (2006-10)			-14.520***			-10.124***
			(3.197)			(2.794)
1^{st} stage F			8.86**			23.09***
$\Delta\tau_{2006}$ (pp)	4.052			4.052		
$\overline{Y}_{t<2006}$	56.4	4.0		56.4	4.0	

*** p<0.01, ** p<0.05, * p<0.1. *Note*: This table replicates the analyses on changes in the stock of high-income taxpayers in Panel A of Table 4 for different subgroups. See notes in Table 4 for details of the model specification. *Source*: Personal income and wealth tax data Obwalden, 2001–2010.

Table 6: Gains and losses in revenue from the 2006 and 2008 reforms (mil. CHF)

	(1)	(2)	(3)	(4)	(5)
	LOSSES	GAINS	NET EFFECT	INCOME TAX	WEALTH TAX
			Panel A: High-income taxpayers		
2006	-6.66	1.00	-5.66	-3.41	-2.26
2007	-7.05	3.88	-3.18	-0.86	-2.32
2008	-7.74	3.31	-4.43	-1.41	-3.02
2009	-9.21	3.99	-5.22	-1.65	-3.57
2010	-8.97	4.55	-4.42	-1.16	-3.26
Total	-39.64	16.73	-22.90	-8.49	-14.41
			Panel B: Non-high-income taxpayers		
2006	-11.54	1.73	-9.81	-6.05	-3.76
2007	-11.51	4.38	-7.12	-3.55	-3.58
2008	-6.06	5.85	-0.21	6.76	-6.98
2009	-7.87	8.18	0.31	7.60	-7.29
2010	-8.36	10.51	2.15	9.40	-7.25
Total	-45.34	30.65	-14.68	14.17	-28.85
			Panel C: All taxpayers		
2006	-18.20	2.73	-15.47	-9.46	-6.01
2007	-18.56	8.26	-10.30	-4.41	-5.89
2008	-13.80	9.16	-4.65	5.35	-10.00
2009	-17.08	12.17	-4.91	5.95	-10.86
2010	-17.33	15.06	-2.26	8.24	-10.50
Total	-84.97	47.38	-37.59	5.68	-43.26

Note: The table presents the mechanical losses and estimated gains in revenue from the 2006 and 2008 tax reforms in Obwalden. High-income taxpayers are those with rate-determining income and/or wealth above the regressive income and/or wealth tax threshold. Losses are calculated as difference between actual income and wealth tax revenue from residents and their hypothetical revenue if all taxes had remained the same as in 2005 (including municipality tax multipliers). Potential behavioral responses to the reforms in form of higher reported taxable income are not taken into account. The reported losses therefore represent an upper bound estimate. Gains are calculated as tax revenue generated by newly arriving taxpayers, irrespective of whether they moved to Obwalden in response to the tax reforms or not. Therefore, the reported gains represent an upper bound. Columns 4 and 5 further decompose the net effect into net gains/losses from income and wealth tax revenue, respectively. *Source*: Personal income and wealth tax data Obwalden, 2001–2010; own calculations.

Table 7: Sectoral job growth in Obwalden and selected cantons

Sector	Growth in FTE jobs							FTE shares (2008)	
	OW	CH	LU	NW	SZ	UR	ZG	OW	CH
Total	15.17	7.72	6.16	3.89	8.90	5.65	15.62	100	100
real estate activities	139.39	24.32	48.28	5.79	27.35	27.14	-0.61	0.31	0.64
information and communication	76.23	7.59	4.21	-11.23	23.34	75.38	24.73	0.92	3.18
water supply, waste management	53.42	6.91	18.01	-28.54	14.20	47.33	66.94	0.59	0.38
professional, scientific, technical	52.32	13.39	10.76	-0.65	10.20	0.11	22.28	4.65	7.26
financial and insurance activities	29.19	10.46	0.44	-8.45	33.56	1.78	30.22	2.28	5.93
public administration	26.11	3.17	4.50	-1.59	23.67	12.41	4.49	3.98	3.94
wholesale and retail trade	24.82	5.11	5.03	-0.88	2.89	6.39	14.93	12.43	14.86
construction	22.01	5.65	5.45	-2.66	8.88	-8.11	6.56	14.06	8.52
administrative service activities	15.87	21.16	14.97	65.73	24.91	18.63	44.34	2.10	3.38
accommodation and food services	15.72	5.10	9.60	-8.16	5.26	-1.14	6.80	9.46	5.32
health and social work	12.84	11.01	11.69	20.38	26.52	16.90	18.69	7.97	10.27
education	10.46	5.13	7.56	14.17	0.91	1.65	19.29	3.47	5.12
manufacturing	7.81	9.34	6.30	13.19	3.56	16.72	10.64	23.96	18.83
transportation and storage	2.81	5.72	-0.01	13.31	6.48	-4.91	26.71	3.42	5.28
electricity, gas	2.76	3.06	17.08	-46.22	23.22	-9.07	20.04	0.56	0.63
other service activities	-1.44	5.84	3.69	5.39	2.51	-1.46	4.24	1.17	2.06
arts, entertainment, recreation	-1.86	10.95	19.92	-21.59	12.25	-29.36	-7.87	0.73	0.95
agriculture, forestry, fishing	-2.14	-4.94	-3.63	-4.05	-0.66	4.33	-1.56	7.64	3.32
mining and quarrying	-5.35	6.86	13.50	-4.04	11.85	9.43	3.31	0.30	0.13

Note: The table shows the growth in full-time equivalent (FTE) employment in each sector in Obwalden (OW), Switzerland (CH), and selected cantons in central Switzerland (Columns 2-7). The last two columns show the share of FTE employment in each sector in 2008 for Obwalden and Switzerland. *Source*: Betriebszählung (BZ), BFS; own calculations.

APPENDICES FOR ONLINE PUBLICATION

Appendix A Additional Tables and Figures

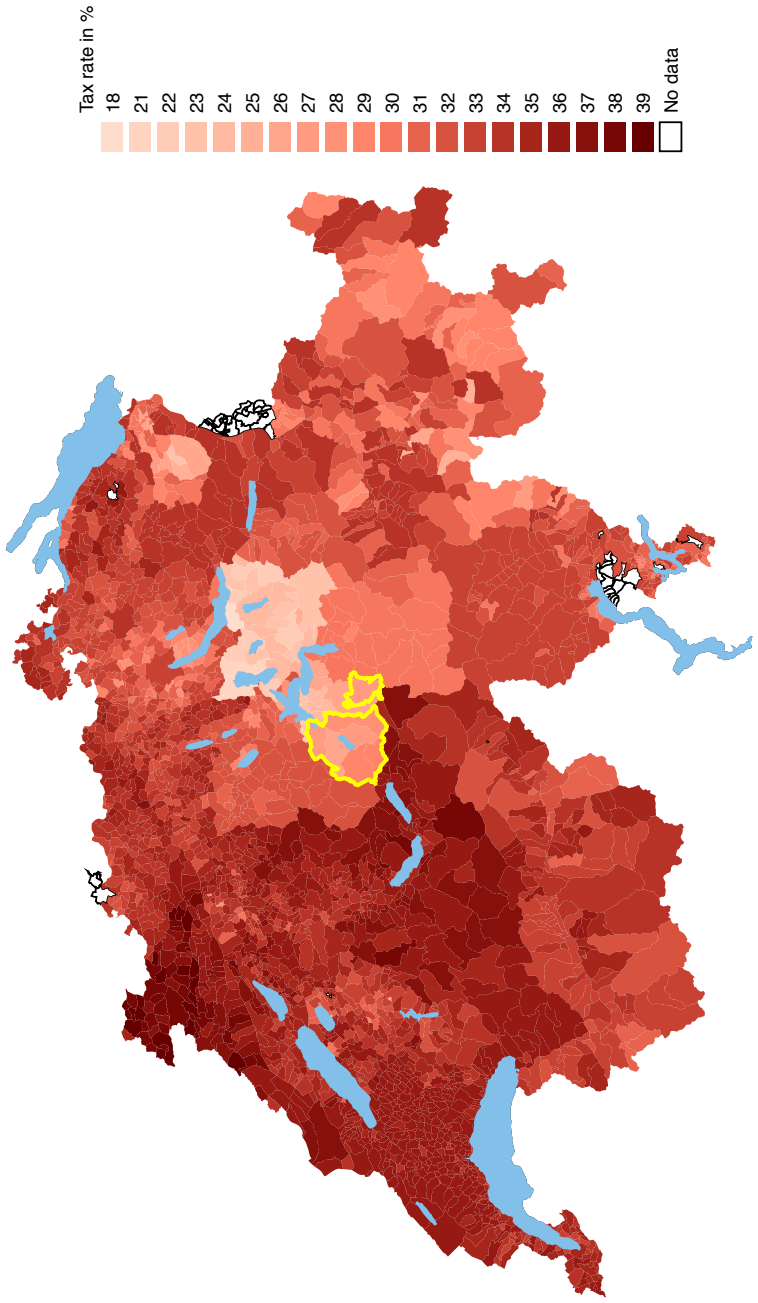


Figure A1: Average income tax for single taxpayer with gross income of 500,000 CHF, 2005

Note: Gross labor income net of social security contributions. Average tax load from federal, cantonal, municipality and church taxes. Obwalden is the yellow-rimmed canton (consisting of two areas) in the center of Switzerland. *Source*: Tax rates courtesy of Raphaël Parchet (2018); geo-data provided by the Federal Statistical Office BFS.

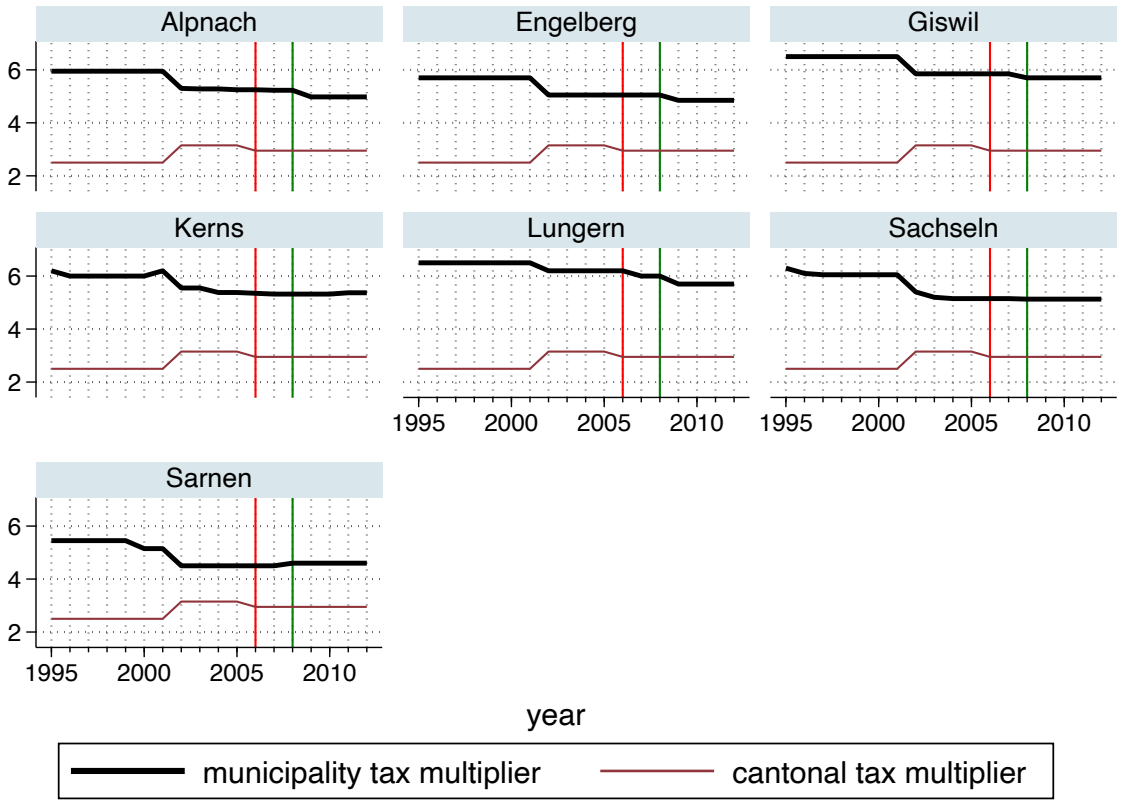
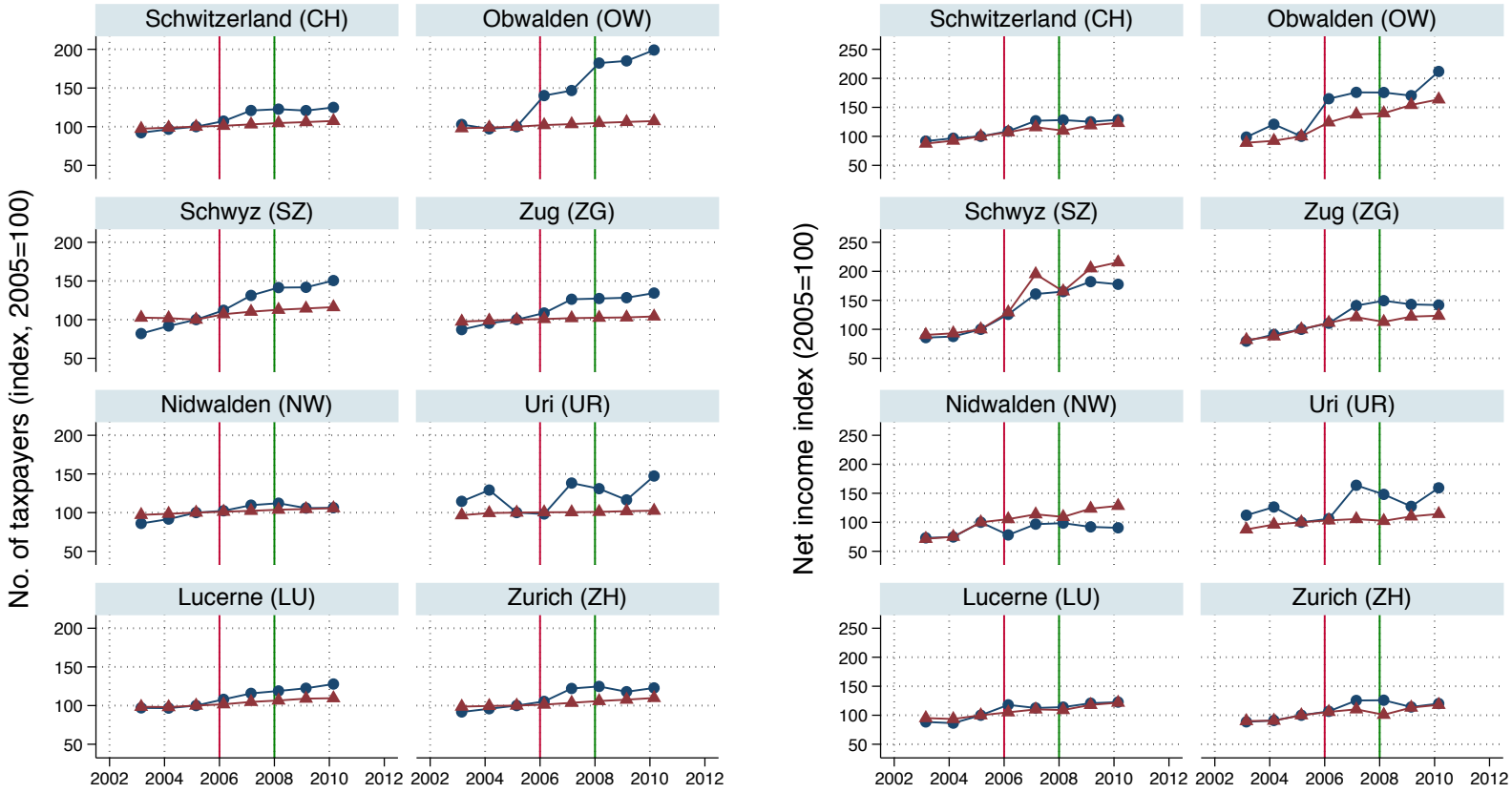


Figure A2: Canton and municipality tax multipliers in Obwalden, 1995-2012

Note: The figure shows the evolution of cantonal (thin red line) and municipality (bold black line) tax multipliers in Obwalden. Tax multipliers are applied to the so-called simple tax to determine the effective tax. The simple tax is obtained by applying the tax schedule determined in the law to rate-determining income. The effective cantonal and municipality tax are then determined by multiplying the simple-tax with the cantonal and municipal tax multipliers, respectively. Multipliers can in principle be changed every year. Note that they are independent of the income level. The simple tax amounted to 11,423 CHF for a gross income of 500,000 CHF in 2005,. In 2006, the simple tax for the same gross income dropped to 9,265 CHF as a result of the tax reform. In 2008, when tax rates were lowered again with the introduction of the flat rate tax, the simple tax was down to 8,609 CHF. *Source*: Tax multipliers courtesy of Raphaël Parchet (2018).



(a) Evolution of taxpayers

(b) Income evolution

Figure A3: Taxpayers and net income in top bracket and overall

Note: The figure shows the evolution of the number of taxpayers (Panel a) and net income (Panel b) for all taxpayers in a canton (red line with triangles) and for taxpayers with net income of 300K CHF and more (blue line with circles), relative to 2005. Net income refers to *revenu net* as defined by the federal income tax: income net of itemized deductions, but not net of social deductions and taxes. Vertical lines highlight 2006 and 2008 tax reforms that took place in Obwalden. The red line in 2006 marks the introduction of the regressive schedule, in 2008 (green line) the flat rate tax came into place. *Source*: Federal income tax data, 2003–2010, ESTV Bern.

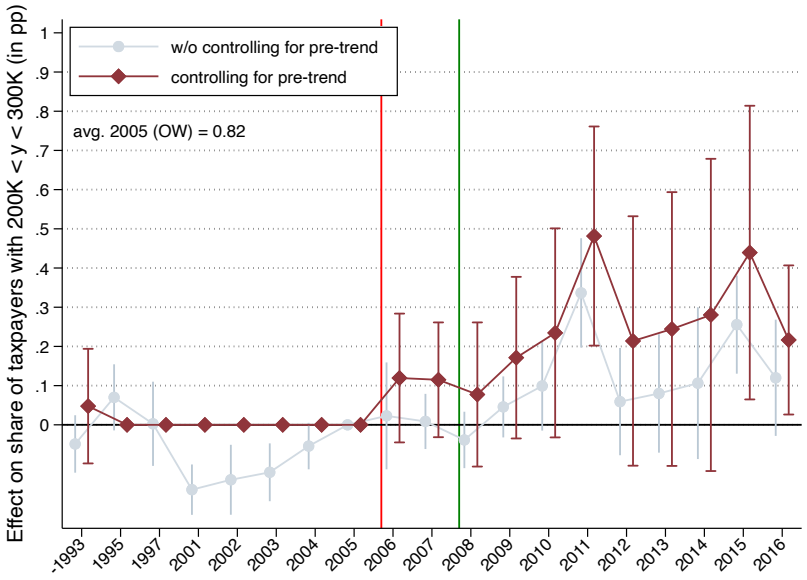
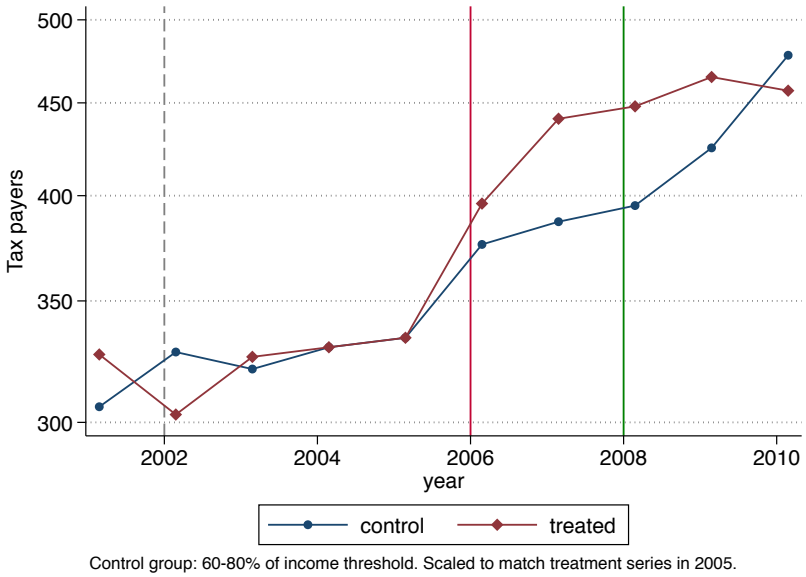
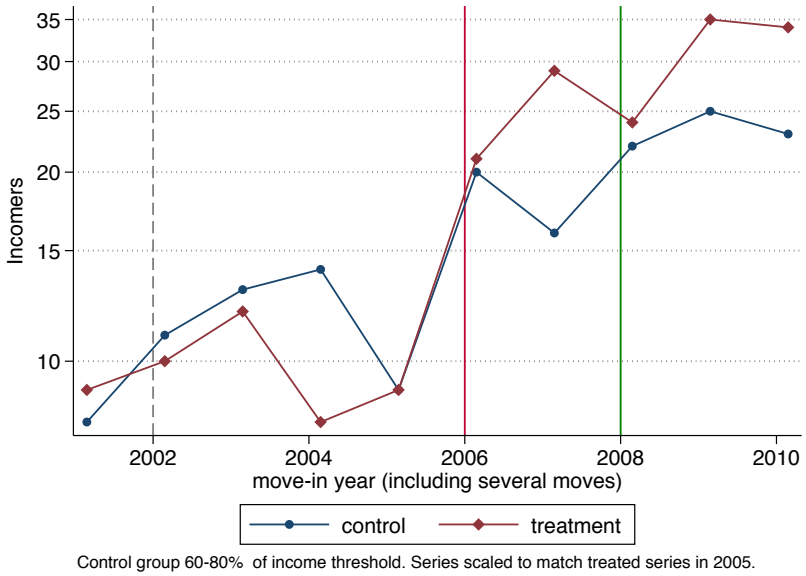


Figure A4: Event study of share of high-income taxpayers (200K–295K CHF)

Note: This figure shows estimates of the effects of the tax reform on the share of high-income taxpayers with net income of 200K–295K CHF—and therefore just below the regressive threshold—in Obwalden compared to the rest of Switzerland. As the underlying unit of observation for the estimates are municipalities, the regressions are weighted by the number of taxpayers in each municipality (holding the weights constant after 2005). I compute the event study estimates using the *xtevent* package in Stata, and account for potential pre-trends using the 'trend' option therein (see Freyaldenhoven et al., 2021b, and Freyaldenhoven et al., 2021a). All regressions include canton and time fixed effects. Note that prior to 2001, tax data does not exist for every year (see Martinez et al., 2020, for details), which is why only estimates for 1995 and 1997 are available. The red line in 2006 marks the introduction of the regressive schedule, in 2008 (green line) the flat rate tax came into place. The vertical bars represent 95% confidence intervals. Standard errors are clustered by canton-year and by municipality. *Source*: Individual federal income tax data, ESTV Bern.



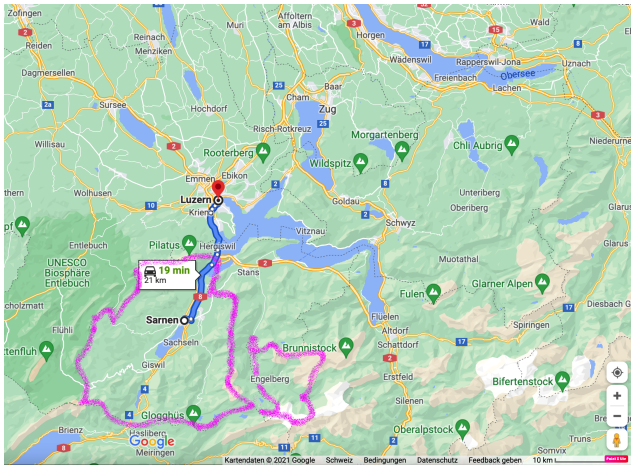
(a) Stock (all residents)



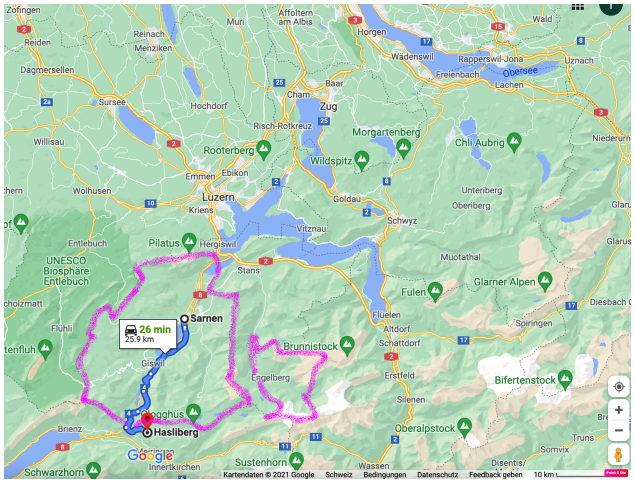
(b) Inflow (new in-movers)

Figure A5: High-income taxpayers in Obwalden, control vs. treatment groups, 2001–2010

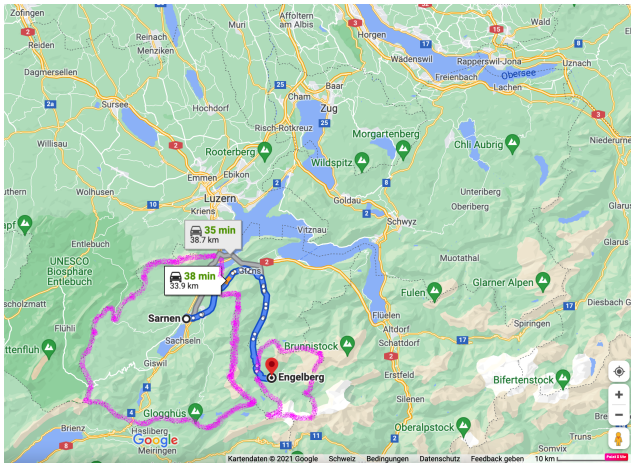
Note: The figure shows the treatment and control groups used to estimate the elasticity of the stock (Panel a) and the inflow (Panel b) of top earners with respect to the income tax. The control group is defined as having rate-determining income of 60–80% of the regressive threshold of 300K CHF, i.e., 180K–240K CHF. The treatment group is always defined as taxpayers with income above the threshold of 300K CHF. The red line in 2006 marks the introduction of the regressive schedule, in 2008 (green line) the flat rate tax came into place. *Source*: Personal income and wealth tax data Obwalden, 2001–2010.



(a) Sarnen (OW) – Lucerne (LU), 21km



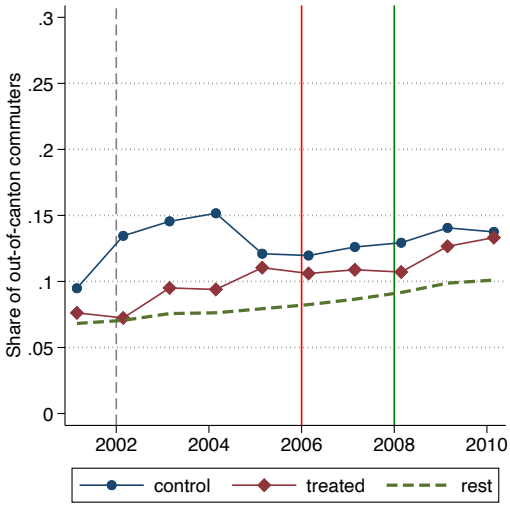
(b) Sarnen (OW) – Hasliberg (BE), 26km



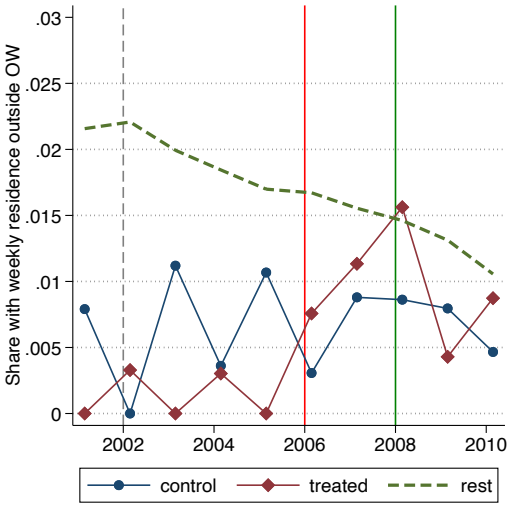
(c) Sarnen (OW) – Engelberg (OW), 34km

Figure A6: Commuting distances out of Obwalden

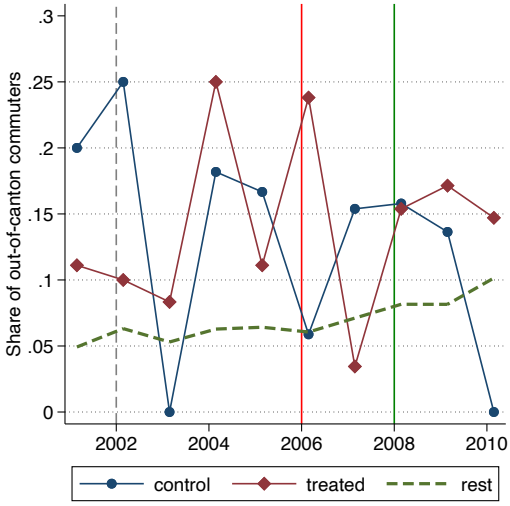
Note: These maps show roads and commuting distances out of the canton from Sarnen, the canton's main town, located in the center of Obwalden. The ski resort town Engelberg is an enclave that belongs to Obwalden but is only accessible through the main road that goes through Nidwalden. For Engelberg residents, any commuting is most likely associated with work outside of the canton. Overall, only 20% of taxpayers living in Engelberg commute at all, compared to 36% of taxpayers in the rest of the canton. *Source*: Google Maps, June 2021.



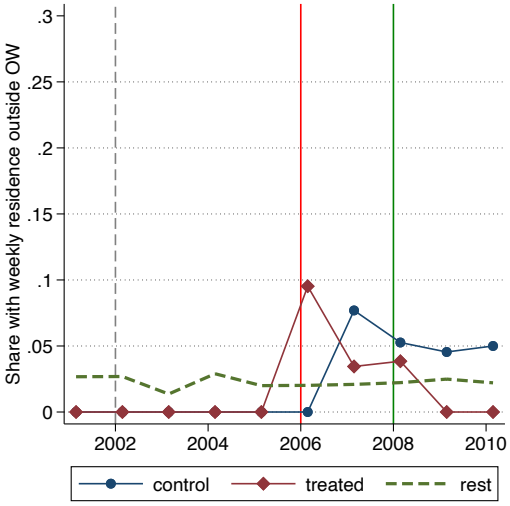
(a) Commuters, residents



(b) Weekly commuters, residents



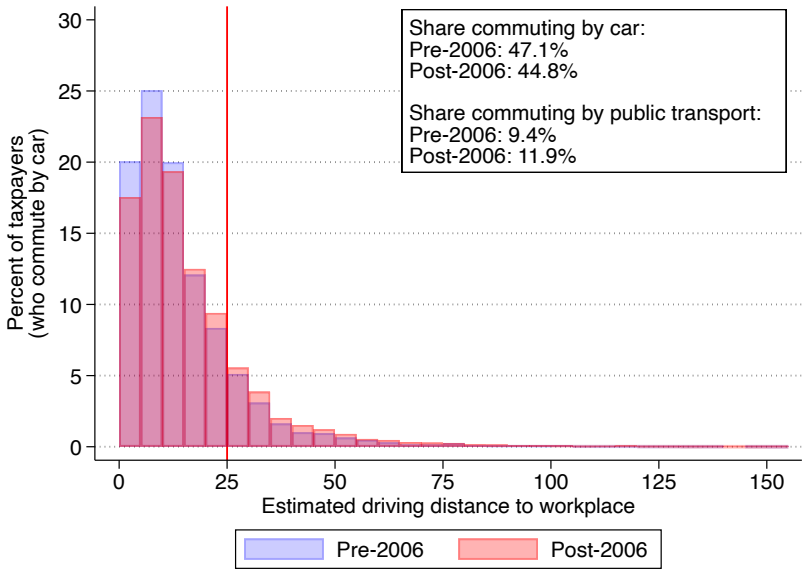
(c) Commuters, in-movers



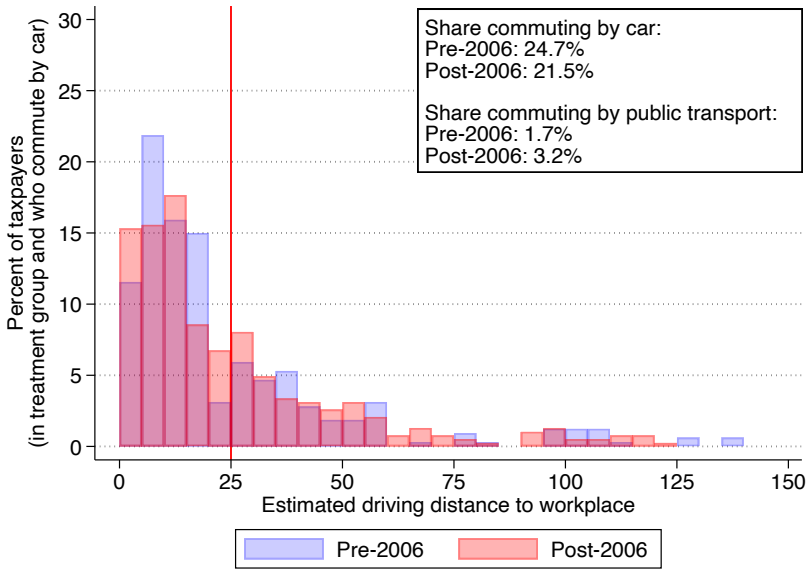
(d) Weekly commuters, in-movers

Figure A7: Commuting patterns, treated vs. non-treated

Note: These plots show how the share of out-of-canton commuters (Panels a, c), and weekly work commuters (Panels b, c) has evolved among the treated, the control group (with incomes of 60–80% of the treatment threshold), and other taxpayers over time, respectively. Panels a) and b) show the rates for all residents, Panels c) and d) show rates for newly arrived taxpayers in the respective year of their arrival in Obwalden. Out-of-canton commuters are identified based on the amount deducted for commuting expenses by car or public transport (see text for details). Weekly commuters are taxpayers who maintain a residence where they spend the week for work reasons, and for which they can claim a special deduction. These arrangements need to be approved on a case-by-case basis by the tax authorities. The red line in 2006 marks the introduction of the regressive schedule, in 2008 (green line) the flat rate tax came into place; the grey dotted line marks the introduction of the Agreement on Free Movement of People (AFMP) with the EU. *Source*: Personal income and wealth tax data Obwalden, 2001–2010.



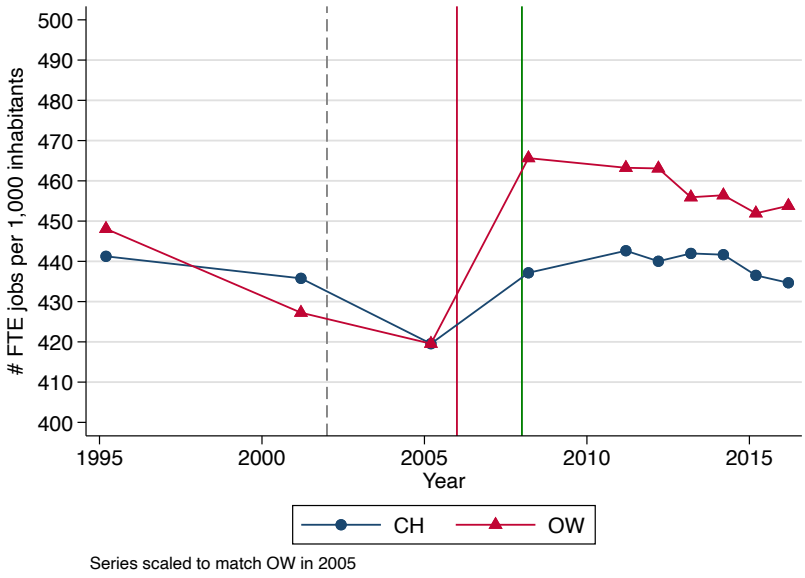
(a) All residents



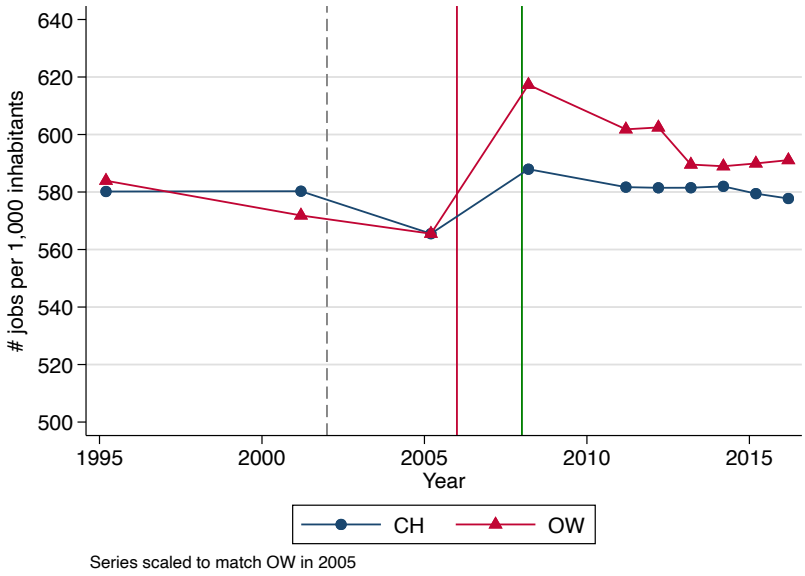
(b) Treated residents

Figure A8: Distribution of commuting distances, pre- vs. post-reform

Note: These plots show the distribution of commuting driving distances (estimated from deductions claimed for commuting by car) prior to and after the reform. Panel a) shows the distribution for the entire resident population. Panel b) shows the distribution for treated residents, i.e., those with income above the regressive threshold of 300K CHF. The vertical red line at 25km indicates the threshold beyond which I assume taxpayers commute out of the canton. Individuals who do not commute by car are not included in the histograms, i.e., those who do not commute at all or who commute by public transport. For deductions made for public transport commuting, it is not possible to infer the distance. The total share of commuters is reported in the text box. Individuals who do not report any labor income are excluded from this analysis. *Source*: Personal income and wealth tax data Obwalden, 2001–2010.



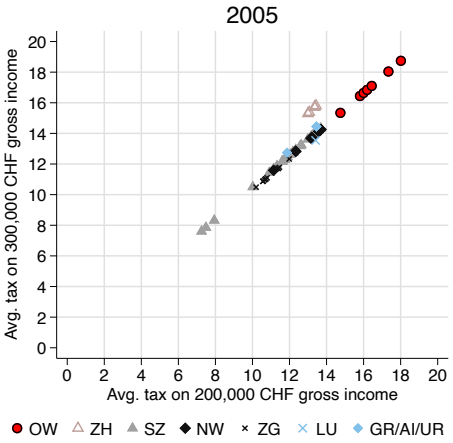
(a) Number of FTE jobs per 1,000 inhabitants, Switzerland vs. Obwalden



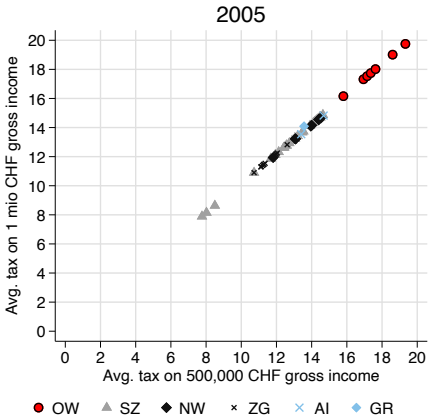
(b) Number of jobs per 1,000 inhabitants, Switzerland vs. Obwalden

Figure A9: Trends in number of jobs in Obwalden and Switzerland, 1995–2016

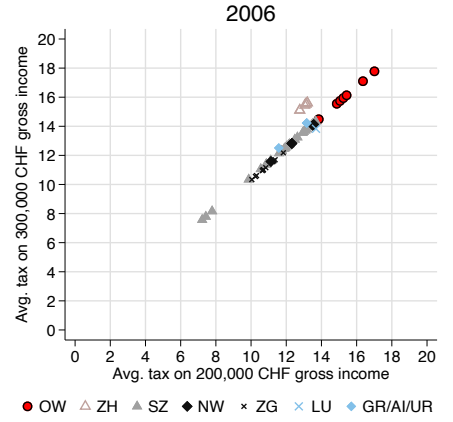
Note: Panel a) shows the number of full-time equivalent (FTE) jobs per 1,000 inhabitants in Obwalden and Switzerland over time. Panel b) shows the number of jobs per 1,000 inhabitants in Obwalden and Switzerland over time. Swiss series are scaled to match Obwalden in 2005. The red line in 2006 marks the introduction of the regressive schedule, in 2008 (green line) the flat rate tax came into place; the grey dotted line marks the introduction of the Agreement on Free Movement of People (AFMP) with the EU. The series are based on Betriebszählung (BZ, 1995–2008) and Statistik der Unternehmensstruktur (STATENT, 2005–2016). These two data sources (available online from Federal Statistics Office BFS) differ in levels but exhibit almost identical growth rates in the overlapping period 2005–2008. I therefore extrapolate the STATENT data backwards based on growth rates obtained from the BZ series. *Source*: STATENT and BZ, BFS.



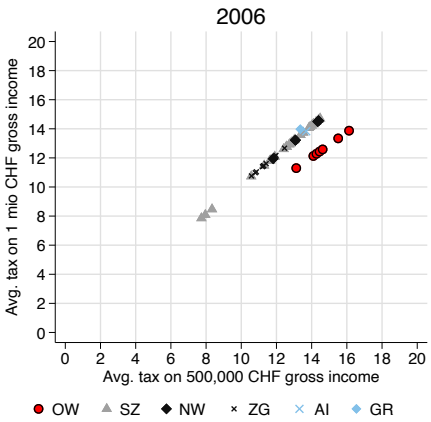
(a) 200K and 300K CHF



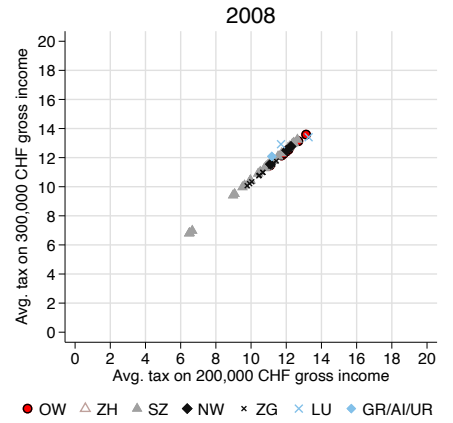
(d) 500K and 1 mil. CHF



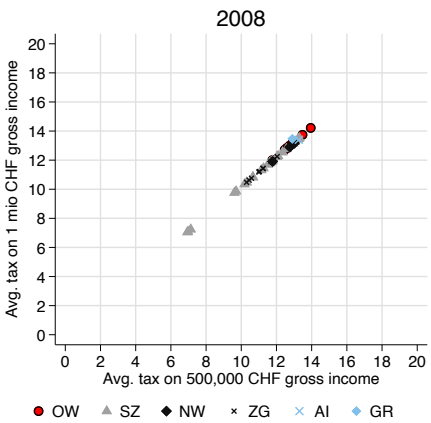
(b) 200K and 300K CHF



(e) 500K and 1 mil. CHF



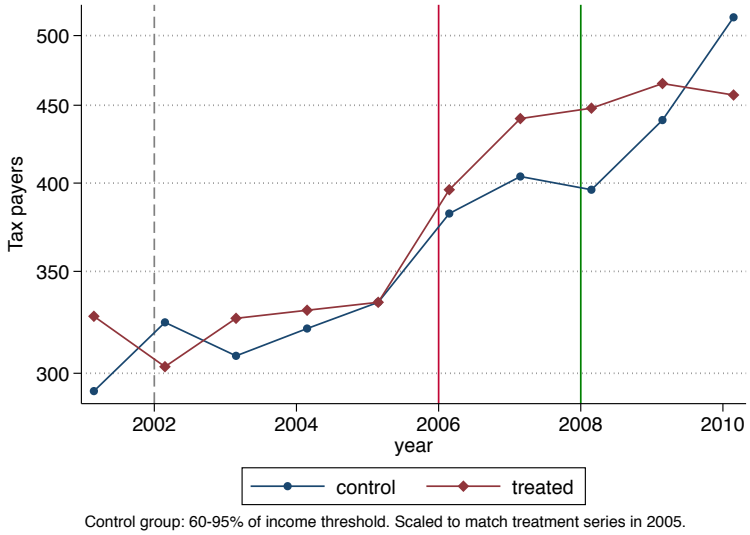
(c) 200K and 300K CHF



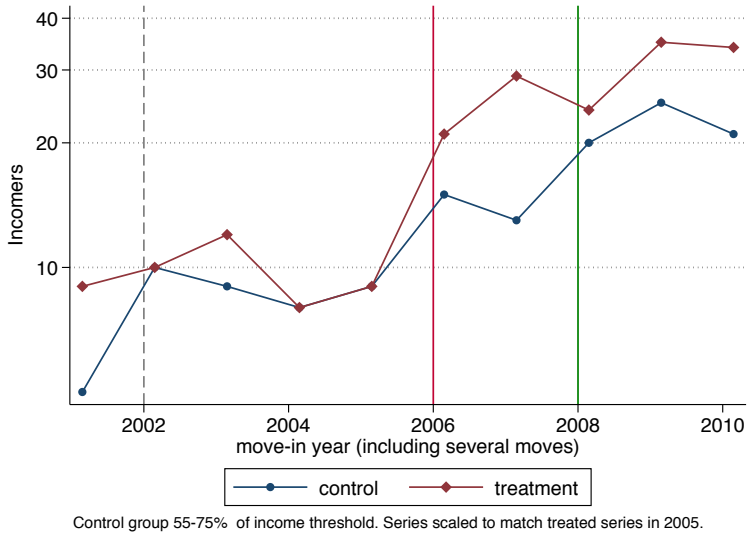
(f) 500K and 1 mil. CHF

Figure A10: Statutory average tax rates in low-tax municipalities and Obwalden

Note: The figure shows effective average income tax rates from cantonal and municipality taxes (incl. church tax) at different income levels for the 50 municipalities with the lowest tax rates and all seven Obwalden municipalities (red circles) in different years. *Source*: Tax rates courtesy of Raphaël Parchet (2018).



(a) Residents, 60–95%



(b) In-movers, 55–75%

Figure A11: Alternative control groups, 2001–2010

Note: The figure shows alternative definitions of the control groups used to estimate the mobility elasticity in Section 4.2. Percentages indicate how the control group is defined in each panel in terms of rate-determining income relative to the regressive threshold of 300K CHF. In Panel a) all resident taxpayers with rate-determining income of 180K–285K CHF fall into the control group defined as having income of 60–95% of the regressive threshold. In Panel b) all new in-movers taxpayers with rate-determining income of 165K–225K CHF fall into the control group defined as having income of 55–75% of the regressive threshold. The treatment group is always defined as taxpayers above the threshold of 300K CHF. *Source*: Personal income and wealth tax data Obwalden, 2001–2010.

Table A1: Macroeconomic conditions in Obwalden and selected Swiss cantons, 2005 (I/II)

		Central Switzerland						Western Switzerland		
		low tax			*average tax*			*high tax*		
	OW	NW	ZG	SZ	LU	GL	UR	FR	VS	JU
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Macroeconomic performance										
GDP p.c.	39,646	73,286	93,753	50,170	43,910	73,236	45,712	39,559	38,385	38,070
AAG GDP p.c. (2001-2005)	2.15	3.68	4.86	0.23	1.53	5.20	0.67	1.80	2.04	0.79
Unemployment rate	1.61	1.96	3.15	2.31	3.07	2.50	1.31	3.09	3.96	4.22
Firms										
in % of total Switzerland	0.54	0.63	2.19	2.14	4.86	0.56	0.49	3.28	4.39	1.05
Share of firms by sector (in %):										
1st sector	33.01	20.20	6.70	19.75	25.63	19.48	34.71	24.70	23.41	25.17
2nd sector	17.76	17.23	12.38	19.46	16.95	21.07	14.90	16.70	15.94	20.97
3rd sector	49.22	62.58	80.92	60.79	57.42	59.46	50.39	58.60	60.64	53.86
Jobs (FTE)										
in % of total Switzerland	0.41	0.49	1.84	1.52	4.75	0.46	0.40	2.85	3.41	0.87
Share of jobs by sector (in %):										
1st sector	12.21	7.75	2.65	8.15	8.46	6.82	11.40	9.65	9.27	10.10
2nd sector	35.81	30.22	26.13	29.73	26.09	41.56	32.28	27.67	26.15	39.34
3rd sector	51.98	62.03	71.22	62.12	65.45	51.62	56.32	62.68	64.59	50.56
Population										
in % of total Switzerland	0.45	0.53	1.43	1.84	4.78	0.51	0.47	3.40	3.91	0.93
Inequality										
Gini	.433	.505	.531	.533	.417	.378	.364	.393	.511	.413
Relative Gini (Switzerland = 1)	.947	1.105	1.162	1.166	.912	.827	.796	.86	1.118	.904

Table A1: Macroeconomic conditions in Obwalden and selected Swiss Cantons, 2005 (II/II)

	Switzerland	Largest cantons		Eastern Switzerland			
	CH	ZH	BE	SG	TG	AR	AI
	(11)	(12)	(13)	(14)	(15)	(16)	(17)
Macroeconomic performance							
GDP p.c.	54,031	68,804	45,644	44,866	44,918	44,215	45,936
AAG GDP p.c. (2001-2005)	2.31	2.54	2.17	0.95	1.26	-1.22	-1.58
Unemployment rate	3.76	4.02	2.83	2.97	3.07	2.19	1.47
Firms							
in % of total Switzerland	100	16.46	13.21	6.37	3.36	0.84	0.32
Share of firms by sector (in %):							
1st sector	14.84	6.14	22.70	18.10	21.89	23.57	42.57
2nd sector	17.19	15.49	17.64	19.75	20.61	18.63	15.65
3rd sector	67.97	78.37	59.67	62.15	57.49	57.80	41.78
Jobs							
in % of total Switzerland	100	19.13	13.33	6.13	2.72	0.56	0.17
Share of jobs by sector (in %):							
1st sector	4.83	1.82	7.58	5.44	8.68	8.97	19.08
2nd sector	25.18	18.35	23.75	33.94	35.11	33.33	29.93
3rd sector	69.99	79.82	68.68	60.62	56.21	57.70	50.99
Population							
in % of total Switzerland	100	17.06	12.83	6.17	3.14	0.70	0.20
Inequality							
Gini	.457	.462	.444	.417	.397	.436	.444
Relative Gini (Switzerland = 1)	1	1.011	.972	.912	.869	.954	.972

Note: All figures refer to 2005. AAG denotes average annual growth over the years 2001–2005. Jobs refer to full-time equivalent (FTE) employment. Population is measured as permanent resident population as of December 31. Gini index is based on net income as reported in federal income tax statistics. *Sources*: GDP, GDP p.c., firm, employment, and population statistics: Federal Statistical Office (BFS). Gini: Federal Tax Administration (ESTV).

Table A2: Origin of in-movers before and after the 2006 reform (in %)

Origin	Treatment		Control		Total	
	before 2006 %	after 2006 %	before 2006 %	after 2006 %	before 2006 %	after 2006 %
ZH	11.63	15.17	21.62	10.99	8.33	9.35
BE	2.33	4.83	2.70	4.40	5.55	5.81
LU	23.26	19.31	18.92	27.47	25.93	24.99
UR	2.33				1.78	1.35
SZ		2.07		1.10	3.14	3.16
NW	13.95	7.59	8.11	10.99	13.64	14.92
GL					0.12	0.17
ZG	11.63	7.59	5.41	5.49	4.35	4.12
FR				1.10	0.42	0.27
SO			5.41	3.30	2.05	1.64
BS	4.65	1.38	5.41	3.30	1.51	1.33
BL	2.33	4.83	5.41	6.59	3.08	2.77
SH					0.30	0.36
AR		0.69			0.18	0.24
AI		0.69			0.03	0.17
SG	2.33		2.70		1.99	1.69
GR		0.69		2.20	1.42	1.47
AG	16.28	11.03	8.11	6.59	6.55	6.80
TG					0.81	0.80
TI	2.33	2.07	2.70	1.10	0.66	0.92
VD		2.76			0.30	0.77
VS					0.97	0.67
NE		0.69			0.09	0.27
GE		2.07	2.70		0.24	0.31
JU		0.69			0.03	0.10
Abroad	6.98	12.41	10.81	12.09	14.13	13.62
Unknown		3.45		3.30	2.35	1.95
Total	100.00	100.00	100.00	100.00	100.00	100.00

Note: The table shows the canton of origin for the treatment group (Columns 1 and 2), the control group (Columns 3 and 4), and the total population (Columns 5 and 6) before and after the 2006 tax reform, respectively. Treatment group: taxpayers with rate-determining income > 300K CHF. Control group defined as those having rate-determining income of 180K–240K CHF, i.e, 60–80% of the regressive threshold. *Source*: Personal income and wealth tax data Obwalden, 2001–2010.

Appendix B Detailed Regression Results

Table B1: First-stage results IV elasticity estimates, 2001-2007

Dependent variable:	(1)	(2)	(3)	(4)
	Residents		In-movers	
net-of-tax rate $(1-\bar{\tau})$	60-80%	55-75%	60-80%	55-75%
DiD_{2006}	0.0305***	0.0308***	0.0447***	0.0447***
	(0.00128)	(0.000958)	(0.00759)	(0.00953)
Treatment	-0.0499***	-0.0440***	-0.0445***	-0.0500***
	(0.00110)	(0.000909)	(0.00746)	(0.00952)
Year = 2001	-0.00240	-0.00181	0.00128	0.00128
	(0.00192)	(0.00126)	(0.0148)	(0.0164)
Year = 2002	-0.00301**	-0.00297**	-0.0226	-0.0140
	(0.00114)	(0.00109)	(0.0115)	(0.0158)
Year = 2003	-0.000229	-0.00102	-0.00494	-0.00279
	(0.000768)	(0.000828)	(0.0110)	(0.00937)
Year = 2004	-0.000489	-0.000579	-0.0114	-0.00845
	(0.00180)	(0.00178)	(0.00886)	(0.00614)
Year = 2006	0.0213***	0.0215***	0.00867	0.0108
	(0.00101)	(0.000871)	(0.00911)	(0.00690)
Year = 2007	0.0220***	0.0211***	0.0141	0.0173*
	(0.00101)	(0.000871)	(0.00911)	(0.00690)
Constant	-0.304***	-0.310***	-0.301***	-0.298***
	(0.000842)	(0.000831)	(0.00903)	(0.00689)
Observations	14	14	14	14
Weak identification F test[a]	570.9	1034	34.64	21.98
P-value	0	0	0.00200	0.00500
Underidentification test[b]	7.330	7.350	6.850	6.580
P-value	0.00700	0.00700	0.00900	0.0100
χ^2 test significance endog. regressors[c]	3.920	8.620	2.720	11.47
P-value	0.0480	0.00300	0.0990	0.00100
S statistic significance endog. regressors[d]	2.620	3.990	2.020	5.370
P-value	0.106	0.0460	0.155	0.0210

*** p<0.01, ** p<0.05, * p<0.1. *Note*: The table shows the fist-stage regressions of the IV-estimates reported in Table 4. Heteroskedasticity-robust standard errors reported in parentheses. *a*) is the Kleibergen and Paap (2006) rk Wald F test for weak instruments, where H_0: instrument is weak. *b*) is the Kleibergen and Paap (2006) rk LM statistic for underidentification, testing whether the instruments are relevant, with H_0: instruments are not relevant. *c*) and *d*) denote the Anderson and Rubin (1949) χ^2 test, and the closely related Stock and Wright (2000) S statistic, respectively, where H_0: the coefficients of the endogenous regressors in the structural equation are jointly equal to zero, and, in addition, the overidentifying restrictions are valid. Both tests are robust to the presence of weak instruments (for details, see the helpfile on Stata-command *ivreg2* by Baum et al., 2010). In the form reported by *ivreg2*, the Anderson-Rubin statistic is a Wald test and the Stock-Wright S statistic is an LM test. Both statistics are distributed as χ^2, with the number of excluded instruments equaling the degrees of freedom. *Source*: Personal income and wealth tax data Obwalden, 2001–2010.

Table B2: First-stage results IV elasticity estimates, 2001-2010

Dependent variable:	(1)	(2)	(3)	(4)
	Residents		In-movers	
net-of-tax rate $(1-\bar{\tau})$	60-80%	55-75%	60-80%	55-75%
DiD_{2006}	0.0305***	0.0308***	0.0447***	0.0447***
	(0.00129)	(0.000968)	(0.00766)	(0.00963)
DiD_{2008}	0.00738***	0.00609***	-0.00374	-0.00261
	(0.00125)	(0.00101)	(0.00763)	(0.0106)
Treatment	-0.0499***	-0.0440***	-0.0445***	-0.0500***
	(0.00111)	(0.000918)	(0.00754)	(0.00962)
Year = 2001	-0.00240	-0.00181	0.00128	0.00128
	(0.00194)	(0.00127)	(0.0150)	(0.0165)
Year = 2002	-0.00301**	-0.00297**	-0.0226*	-0.0140
	(0.00115)	(0.00110)	(0.0116)	(0.0159)
Year = 2003	-0.000229	-0.00102	-0.00494	-0.00279
	(0.000776)	(0.000836)	(0.0111)	(0.00947)
Year = 2004	-0.000489	-0.000579	-0.0114	-0.00845
	(0.00182)	(0.00180)	(0.00895)	(0.00620)
Year = 2006	0.0213***	0.0215***	0.00867	0.0108
	(0.00102)	(0.000880)	(0.00920)	(0.00697)
Year = 2007	0.0220***	0.0211***	0.0141	0.0173**
	(0.00102)	(0.000880)	(0.00920)	(0.00697)
Year = 2008	0.0596***	0.0607***	0.0543***	0.0595***
	(0.00112)	(0.000997)	(0.00916)	(0.00882)
Year = 2009	0.0634***	0.0645***	0.0671***	0.0664***
	(0.000911)	(0.000911)	(0.00925)	(0.00838)
Year = 2010	0.0623***	0.0638***	0.0564***	0.0567***
	(0.00103)	(0.000889)	(0.00917)	(0.00734)
Constant	-0.304***	-0.310***	-0.301***	-0.298***
	(0.000851)	(0.000839)	(0.00912)	(0.00696)
Observations	20	20	20	20
Weak identification F test[a]	464.8	1436	361.6	69.25
P-value	0	0	0	0
Underidentification test[b]	11.59	9.940	6.470	6.230
P-value	0.00300	0.00700	0.0390	0.0440
χ^2 test significance endog. regressors[c]	4.560	8.630	5	16.30
P-value	0.103	0.0130	0.0820	0
S statistic significance endog. regressors[d]	2.680	4.730	5.560	9.400
P-value	0.262	0.0940	0.0620	0.00900

*** p<0.01, ** p<0.05, * p<0.1. *Note*: The table shows the fist-stage regressions of the IV-estimates reported in Table 4. See notes in Table B1 for details. *Source*: Personal income and wealth tax data Obwalden, 2001–2010.

Table B3: Estimates of stock of taxpayers in Obwalden

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Control group			*60–80%*				*60–95%*	
	DiD (level)	DiD (log)	2SLS (log)	OLS (log)	2SLS (log)	OLS (log)	2SLS (log)	2SLS (log)
DiD_{2006}	31.20*	0.045						
	(14.77)	(0.038)						
η^S (2006-07)			1.459*	1.490			2.011***	
			(0.745)	(1.092)			(0.677)	
η^S (2006-10)					1.492**	1.395		1.891***
					(0.742)	(1.024)		(0.671)
Treatment	53.80***	0.181***	0.254***	0.255***	0.251***	0.247***	-0.097***	-0.093***
	(7.79)	(0.027)	(0.028)	(0.045)	(0.030)	(0.044)	(0.020)	(0.021)
Year = 2002	-1.00	0.004	0.005	0.005	0.005	0.005	0.006	0.006
	(19.30)	(0.067)	(0.039)	(0.066)	(0.039)	(0.062)	(0.040)	(0.041)
Year = 2003	6.50	0.026	0.023	0.023	0.023	0.023	0.017	0.017
	(12.79)	(0.047)	(0.027)	(0.045)	(0.029)	(0.045)	(0.026)	(0.022)
Year = 2004	13.00	0.048	0.046*	0.045	0.045	0.046	0.039	0.039*
	(12.55)	(0.046)	(0.026)	(0.044)	(0.028)	(0.044)	(0.025)	(0.021)
Year = 2005	17.50	0.063	0.060**	0.059	0.059**	0.060	0.061**	0.061***
	(12.54)	(0.046)	(0.026)	(0.044)	(0.028)	(0.044)	(0.025)	(0.023)
Year = 2006	54.90**	0.199**	0.164***	0.163*	0.163***	0.167**	0.129***	0.134***
	(17.05)	(0.053)	(0.041)	(0.064)	(0.041)	(0.061)	(0.037)	(0.035)
Year = 2007	84.90***	0.275***	0.239***	0.238**	0.238***	0.242***	0.211***	0.216***
	(17.05)	(0.053)	(0.041)	(0.064)	(0.042)	(0.063)	(0.037)	(0.034)
Year = 2008					0.217***	0.224**		0.163***
					(0.061)	(0.088)		(0.061)
Year = 2009					0.271***	0.278**		0.220***
					(0.059)	(0.085)		(0.054)
Year = 2010					0.329***	0.336**		0.277***
					(0.072)	(0.108)		(0.061)
Constant	263.60***	5.573***	6.020***	6.030***	6.033***	6.002***	6.569***	6.527***
	(13.13)	(0.048)	(0.236)	(0.345)	(0.234)	(0.323)	(0.219)	(0.217)
Observations	14	14	14	14	20	20	14	20
R-squared	0.98	0.975	0.976	0.976	0.975	0.975	0.972	0.969
$\Delta\tau_{2006}$ % pts	3.841	3.841	3.841	3.841	3.841	3.841	3.841	3.841
$\Delta\tau_{2008}$ % pts	1.268	1.268	1.268	1.268	1.268	1.268	1.268	1.268
F	40.61	36.40		49.51		105.5		
Hausman[1]			-0.000103		-0.0415		-0.000182	-0.0227
P-value			1		1		1	1

*** p<0.01, ** p<0.05, * p<0.1. *Note*: The table shows detailed results of the regression estimates reported in Panel A of Table 4. Columns 4 and 6 in addition report estimates of OLS regressions in a specification equivalent to the 2SLS regressions. Heteroskedasticity-robust standard errors reported in parentheses. [1]Test statistic of a Hausman exogeneity test comparing OLS and 2SLS models. The table shows detailed regression results of the results shown in top Panel A of Table 4. η^F (2006-07) and η^F (2006-10) are the short- and long-run stock elasticity estimates, respectively. $\Delta\tau_{2006}$ and $\Delta\tau_{2008}$ show the change in the tax rate for the treatment group in 2006 and 2008.
Source: Personal income and wealth tax data Obwalden, 2001–2010.

Table B4: Elasticity estimates for inflow of taxpayers to Obwalden

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Control group			*60–80%*				*55–75%*	
	DiD (level)	DiD (log)	2SLS (log)	OLS (log)	2SLS (log)	OLS (log)	2SLS (log)	2SLS (log)
DiD_{2006}	8.40	0.291						
	(5.18)	(0.295)						
η^F (2006-07)			6.51*	7.05			9.98***	
			(3.77)	(5.47)			(2.57)	
η^F (2006-10)					4.034	5.071		7.210***
					(3.377)	(4.512)		(2.626)
Treatment	1.60	0.216	0.51***	0.52*	0.488***	0.527**	0.55***	0.523***
	(1.28)	(0.161)	(0.14)	(0.20)	(0.144)	(0.192)	(0.12)	(0.125)
Year = 2002	1.50	0.197	0.34**	0.36	0.384***	0.409**	0.24***	0.466***
	(0.86)	(0.112)	(0.13)	(0.22)	(0.107)	(0.148)	(0.06)	(0.052)
Year = 2003	3.50***	0.399**	0.43***	0.43*	0.516***	0.522***	0.17***	0.429***
	(0.86)	(0.114)	(0.11)	(0.19)	(0.095)	(0.146)	(0.03)	(0.035)
Year = 2004	2.00	0.244	0.32	0.32	0.387*	0.400	-0.03	0.214**
	(2.84)	(0.335)	(0.21)	(0.34)	(0.229)	(0.350)	(0.05)	(0.090)
Year = 2005	7.30	0.799**	0.74***	0.73*	0.096	0.098	0.33***	0.265***
	(4.47)	(0.255)	(0.18)	(0.30)	(0.088)	(0.141)	(0.12)	(0.076)
Year = 2006	9.30*	0.826**	0.73***	0.71*	0.916***	0.885***	0.36***	0.684***
	(4.47)	(0.255)	(0.20)	(0.31)	(0.155)	(0.240)	(0.13)	(0.113)
Year = 2007					0.921***	0.885***		0.732***
					(0.175)	(0.240)		(0.133)
Year = 2008					0.992***	0.939***		0.747***
					(0.186)	(0.253)		(0.157)
Year = 2009					1.162***	1.096***		0.952***
					(0.234)	(0.320)		(0.173)
Year = 2010					1.143***	1.088***		0.924***
					(0.211)	(0.297)		(0.174)
Constant	6.70***	1.886***	3.84***	4.01*	2.957***	3.272**	5.20***	4.052***
	(1.05)	(0.138)	(1.16)	(1.70)	(1.024)	(1.373)	(0.77)	(0.786)
Observations	14	14	14	14	20	20	14	20
R-squared	0.91	0.889	0.90	0.90	0.943	0.944	0.97	0.971
$\Delta\tau_{2006}$ % pts	4.605	4.606	4.607	4.608	4.609	4.610	4.611	4.612
$\Delta\tau_{2008}$ % pts	1.824	1.825	1.826	1.827	1.828	1.829	1.830	1.831
F	8.818	18.39		6.841		184.4		
Hausman[1]			-0.0189		-0.0318		-0.0269	-0.170
P-value			1		1		1	1

*** p<0.01, ** p<0.05, * p<0.1. *Note*: The table shows detailed results of the regression estimates reported in Panel B of Table 4. Columns 4 and 6 in addition report estimates of OLS regressions in a specification equivalent to the 2SLS regressions. Heteroskedasticity-robust standard errors reported in parentheses. [1]Test statistic of a Hausman exogeneity test comparing OLS and 2SLS models. The table shows detailed regression results of the results shown in top Panel A of Table 4. η^F (2006-07) and η^F (2006-10) are the short- and long-run stock elasticity estimates, respectively. $\Delta\tau_{2006}$ and $\Delta\tau_{2008}$ show the change in the tax rate for the treatment group in 2006 and 2008.
Source: Personal income and wealth tax data Obwalden, 2001–2010.

Table B5: Elasticity estimates based on the share of taxpayers

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Stock elasticities				Flow elastictites			
Control group	*60–80%* 2SLS	*60–95%* 2SLS	*60–80%* 2SLS	*60–95%* 2SLS	*60–80%* 2SLS	*55–75%* 2SLS	*60–80%* 2SLS	*55–75%* 2SLS
$\eta_{(2006-2010)}$	4.001***	1.900*	3.932***	1.976*	0.891***	1.023***	0.396	0.625**
	(1.238)	(1.050)	(1.251)	(1.046)	(0.319)	(0.271)	(0.339)	(0.285)
Treatment	0.433***	-0.204***	0.440***	-0.206***	0.048***	0.053***	0.044***	0.049***
	(0.054)	(0.031)	(0.055)	(0.034)	(0.014)	(0.013)	(0.014)	(0.013)
Year = 2001	-0.027	-0.056	-0.028	-0.056	-0.003	-0.010**	-0.002	-0.010
	(0.030)	(0.041)	(0.027)	(0.042)	(0.007)	(0.005)	(0.006)	(0.009)
Year = 2002	-0.044	-0.054	-0.044	-0.054	0.028**	0.020***	0.017*	0.014*
	(0.040)	(0.047)	(0.044)	(0.045)	(0.011)	(0.008)	(0.009)	(0.008)
Year = 2003	-0.031***	-0.055***	-0.031***	-0.055***	0.022***	0.011***	0.020**	0.010
	(0.007)	(0.017)	(0.005)	(0.018)	(0.008)	(0.002)	(0.008)	(0.008)
Year = 2004	-0.004*	-0.022**	-0.004	-0.022**	0.020**	0.004*	0.015	0.001
	(0.003)	(0.010)	(0.003)	(0.009)	(0.010)	(0.002)	(0.015)	(0.009)
Year = 2006	0.058	0.142***	0.060	0.139***	0.027*	0.009	0.042***	0.022
	(0.050)	(0.042)	(0.052)	(0.041)	(0.015)	(0.012)	(0.014)	(0.014)
Year = 2007	0.160***	0.268***	0.163***	0.265***	0.031*	0.015	0.049***	0.031**
	(0.051)	(0.042)	(0.051)	(0.042)	(0.017)	(0.014)	(0.017)	(0.016)
Year = 2008			0.067	0.181**			0.048***	0.028
			(0.094)	(0.089)			(0.018)	(0.018)
Year = 2009			0.129	0.277***			0.070***	0.056***
			(0.089)	(0.074)			(0.026)	(0.021)
Year = 2010			0.193*	0.374***			0.066***	0.048**
			(0.100)	(0.115)			(0.024)	(0.022)
Constant	2.421***	2.327***	2.394***	2.354***	0.301***	0.351***	0.143	0.224***
	(0.382)	(0.336)	(0.387)	(0.335)	(0.097)	(0.081)	(0.103)	(0.086)
Observations	14	14	20	20	14	14	20	20
R-squared	0.972	0.970	0.964	0.950	0.897	0.921	0.896	0.930
F	24.94	50.08	31.46	47.29	15.49	15.49	15.49	15.49

*** p<0.01, ** p<0.05, * p<0.1. Robust standard errors in parentheses.
The table shows detailed regression results of elasticity estimates analogous to those presented in Table 4, with the important difference that here the dependent variable is not the number of taxpayers in the treatment and control group but the share of taxpayers in each group (with respect to the total number of taxpayers in the canton). In Columns 3, 4, 7, 8, η corresponds to the long-run elasticity (2006-10).
Source: Personal income and wealth tax data Obwalden, 2001–2010.

EXTENSION: The Elasticity of Taxable Income

The tax reductions induced by the 2006 (and 2008) reform did not only make it attractive for taxpayers outside Obwalden to move, but also created incentives for residents to adjust their taxable income. By increasing their taxable income above the regressive threshold, taxpayers could reduce their average tax rate. Figure E1 shows the smoothed distribution of taxpayers over different pre- and post-reform periods around the regressive threshold. While the distribution does shift slightly over time, changes are very small and only visible with large income bins of 10,000 CHF and by smoothing the lines using a lowess smoothing function. The distributions do not indicate any bunching or missing mass This stands in contrast to, for example, the introduction of the Danish low-tax regime for high-income foreigners studied by Kleven et al. (2014; see Figure 6 therein).

If residents responded by adjusting their taxable income, we would likely see larger changes in income from self-employment or capital income than in labor income. I compare the evolution of total income and income from different components among taxpayers belonging to the treatment and control group, respectively, in a balanced panel of taxpayers who are present over the whole 10-year period. Figure E3 shows event study graphs for the evolution of labor, capital, and self-employment income of treated relative to non-treated residents (control group with income in the range of 60-95% of the threshold). No clear pattern emerges from this exercise. Similarly, I find no clear pattern when comparing taxpayers with income of 180,000 CHF (i.e., 60% of the threshold) and higher with the rest of taxpayers.

To estimate the ETI for the total population as well as for different sub-groups, such as high-income earners, I therefore follow the panel approach by Gruber and Saez (2002). Abstracting from income effects,[30] the resulting "reported income supply function" reads as $z_{it}(1-\tau_{jt})$. This function is crucial to determine the elasticity of reported income with respect to the marginal net-of-tax rate, defined as

$$e = \frac{(1-\tau_{jt})}{z_{it}} \cdot \frac{\partial z_{it}}{\partial(1-\tau_{jt})}. \tag{E1}$$

The corresponding empirical panel regression specification can be written as follows:

$$\log(z_{it_2}/z_{it_1}) = e \cdot \log[(1-\tau_{t_2})/(1-\tau_{t_1})] + \upsilon_{it}, \tag{E2}$$

where z_{it_1} and z_{it_2} is reported income in year t_1 and t_2, respectively, and e is the ETI with respect to the net-of-marginal-tax rate, $(1-\tau)$. Note that OLS estimates of (E2) are biased, as the term capturing the tax rate change is correlated with the error term υ_{it}. If there is a

[30] With the exception of Gruber and Saez (2002), the ETI literature usually abstracts from income effects. Empirical estimates suggest that income effects are small, especially in the case of reported income (see for example the estimates in Kleven and Schultz, 2014). For a discussion of the relevance of income effects in the estimation of the ETI the reader is referred to Gruber and Saez (2002) and (Saez et al., 2012, especially pp.5–6); for an overview on income effects in labor supply models see Blundell and MaCurdy (1999).

positive shock to income ($\upsilon_{it} > 0$), then, due to the regressive scheme, the marginal tax rate τ decreases mechanically. Gruber and Saez (2002) propose as a natural instrument the predicted net-of-tax rate change if income does not change from year 1 to year 2, i.e., $\log(1 - \tau_{t_2}(z_1))$.

Such an IV estimation is still susceptible to bias, due to (i) mean reversion (as some particularly high or low incomes are just transitory), and (ii) exogenous changes in the income distribution. Both result in a correlation between z_{it_1} and υ_{it}.[31] The solution proposed by Auten and Carroll (1999) and adopted in Gruber and Saez (2002) is to include a large set of income controls from base-year t_1. However, as Weber (2014) shows, base-year income in t_1 is still correlated with the error in a panel setting. She therefore suggests to use lagged base-year income controls, z_{it_1-s}. Having many years of data, it is possible to add a rich set of such controls. Therefore, in addition to log income in period $t_1 - s$, I include a 10-piece spline in lagged log base-year income (i.e., a spline for each decile of the gross income distribution in $t_1 - s$) to allow for non-linear effects from mean reversion and changes in the income distribution, as in Gruber and Saez (2002). Because the endogeneity of z_{it_1} also affects the tax rate instrument, I use a lag of base-year income to mitigate potential endogeneity bias, following Weber (2014). Without this measure, indeed elasticity estimates turn out either unreasonably large or negative and are overall very unstable.

I further include a vector of individual controls, $\mathbf{X_{it}}$, containing the age and age squared of the main taxpayer and a set of variables which characterize the household, namely dummies for married, children, double-earners (married taxpayers only), retirees, and self employed. Time dummies λ_t absorb period effects, and I include municipality dummies to control for location specific effects. Including all these covariates into Equation (E2), the econometric model reads as follows:

$$\begin{aligned} \log\left(\frac{z_{it_2}}{z_{it_1}}\right) &= \alpha_0 + e \cdot \log\left[\frac{1-\tau_{t_2}(z_1)}{1-\tau_{t_1}(z_1)}\right] + \mathbf{X_{it}}\boldsymbol{\beta} \\ &+\alpha_1 \log(z_{it_1-s}) + \sum_{k=1}^{10} \alpha_{2k} SPLINE_k(z_{it_1-s}) + \lambda_t + \upsilon_{it} \end{aligned} \tag{E3}$$

This identification strategy relies on the assumption that mean reversion or changes in inequality are not correlated with year-specific tax changes, so that the relationship between z_{it_1} and υ_{it} remains constant over time (see Gruber and Saez, 2002, p.12).

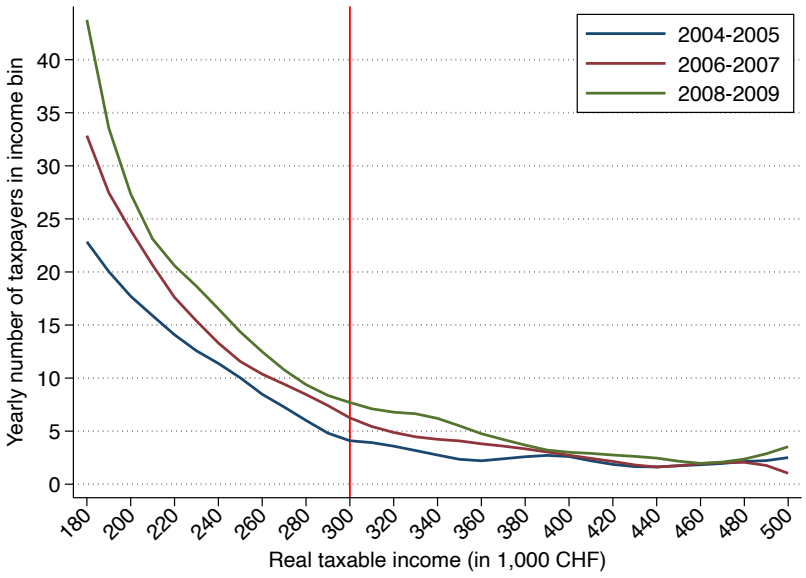
Table E1 shows the result for the total population (Column 1) and different sub-groups (Columns 2–8). All samples exclude low-income taxpayers (defined as individual taxpayers with real annual taxable income <20,000 CHF and married taxpayers with annual income <35,000 CHF). Panel A shows estimates without individual fixed effects, while bottom Panel B shows the results from specifications including individual fixed effects. The specification is very sensitive to

[31] For an extensive discussion on consistent ETI estimates, circumventing the problems of mean reversion and exogenous income trends, see Weber (2013, 2014).

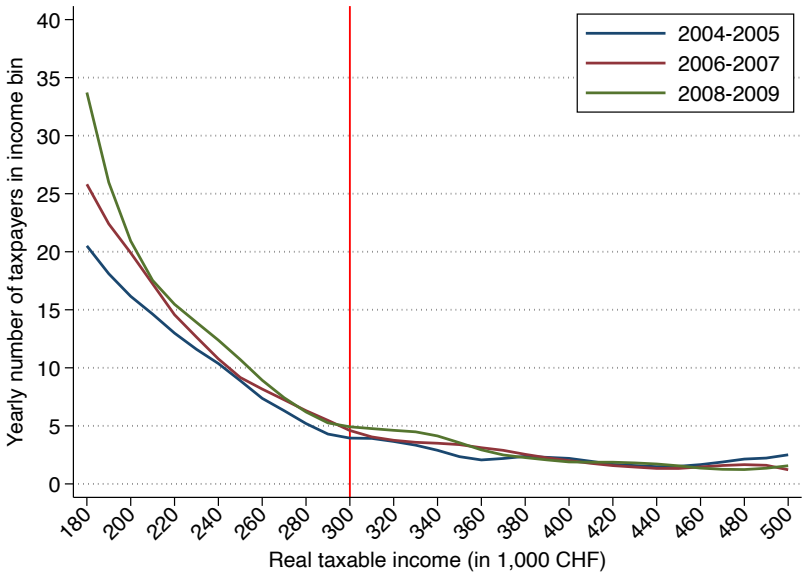
the inclusion of these individual fixed effects. Across all samples, the estimated elasticity drops substantially when fixed effects are included, and estimates are less likely to remain statistically significant. Without the inclusion of individual fixed effects, the estimated ETI for the total population is 0.82 (which is rather large compared to findings from other countries) but drops to 0.21 when including fixed effects (estimate statistically not different from zero).

When it comes to different population groups, it seems to be the case that high-income earners—defined as belonging either to the treatment or the 60-95% of the income threshold control group at least once over the 2001–2010 period—have higher elasticites (Column 2). Even after including individual fixed effects, e remains slightly larger than one. Columns 3 and 4 suggest that this is driven by individuals in the control group, among whom the ETI is 1.4. For all other groups which may be assumed to be more responsive to taxation, I cannot identify robust evidence of a significant ETI. The coefficient on lagged base-year income on the other hand is significant in most specifications, implying that there is mean-reversion in the income generating process at the top. Note that overall, the R^2 are all very small or even negative in the specifications including fixed effects.

The takeaway from this analysis is that the ETI seems to be largest among those taxpayers with high incomes below the regressive threshold (in the range of 180,000—285,000 CHF). With an estimate of e =1.4 the ETI turns out to be particularly high for this group. However, given that I fail to identify a significant ETI for most population groups, these results must be interpreted with caution.



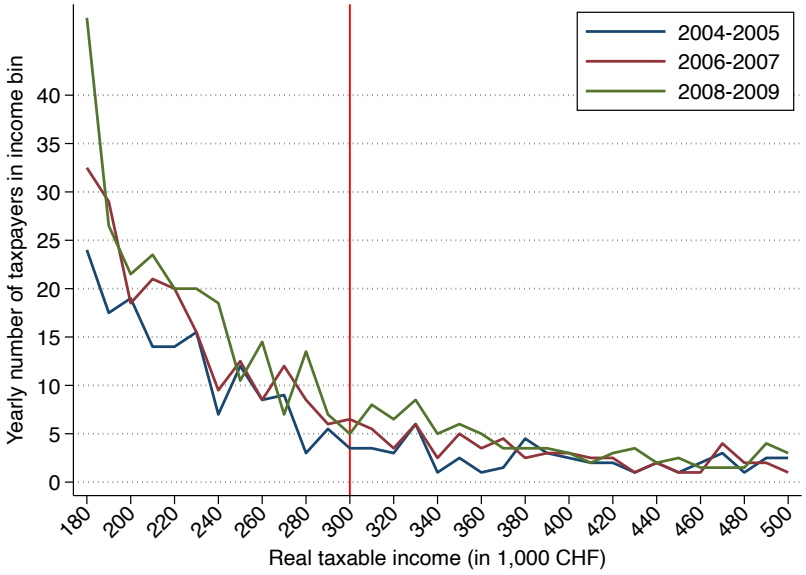
(a) All taxpayers



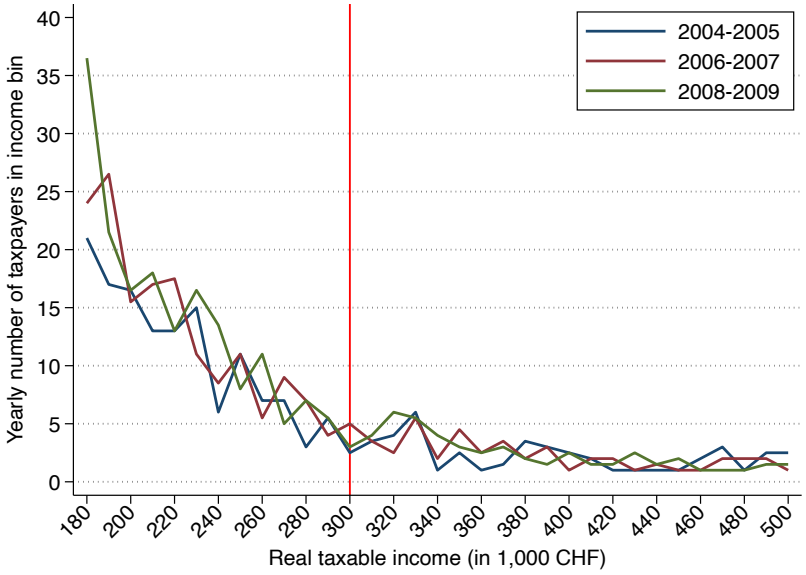
(b) Pre-2006 residents only

Figure E1: Smoothed taxable income distribution in pre- and post-reform years

Note: The figure shows the distribution of taxable income in the range of 60-166% of the regressive income threshold for different years. The blue line shows the distribution for pre-reform years 2004–2005. The red line shows the distribution for years 2006–2007, when the regressive income tax was in place. The green line finally shows the distribution for the years 2008–2009, when the flat rate tax was in place. Displayed lines are lowess smooth estimates of the underlying data. Raw line plots of the original data are noisy, making it difficult to identify any shifts in the distribution (see Figure E2). Underlying bins are in steps of 10,000 CHF, hence on average 24 taxpayers declared income in the range of 180K-190K CHF in the years 2004 and 2005. The red vertical line indicates the regressive threshold. Panel A) includes all taxpayers, Panel B) includes only taxpayers who had moved to Obwalden before 2006 and who were present for at least 4 years. *Source*: Personal income and wealth tax data canton Obwalden, 2001–2010.



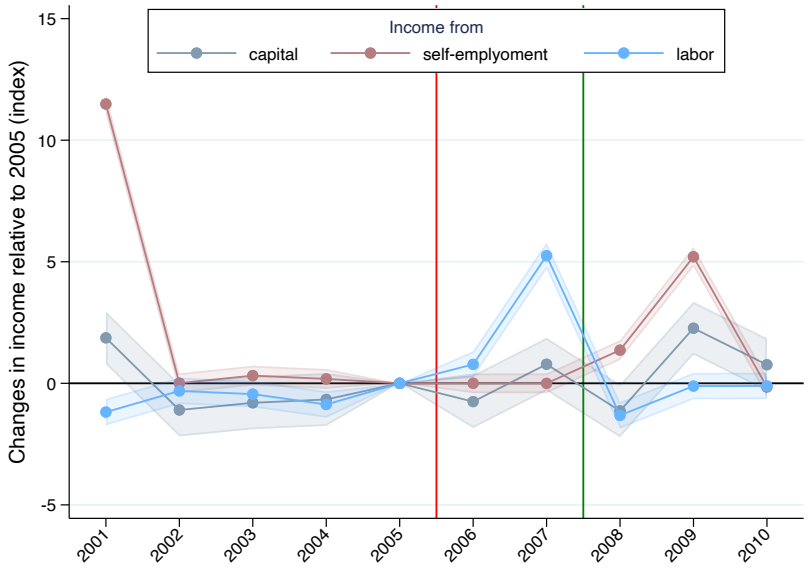
(a) All taxpayers



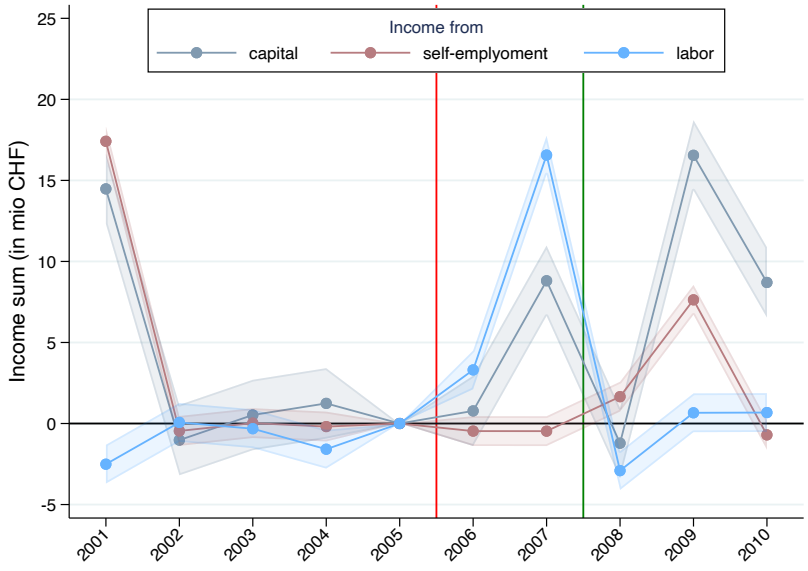
(b) Pre-2006 residents only

Figure E2: Raw taxable income distribution in pre- and post-reform years

Note: The figure shows the distribution of taxable income in the range of 60-166% of the regressive income threshold for different years. The blue line shows the distribution for pre-reform years 2004–2005. The red line shows the distribution for years 2006–2007, when the regressive income tax was in place. The green line finally shows the distribution for the years 2008–2009, when the flat rate tax was in place. Underlying bins are in steps of 10K CHF, hence on average 24 taxpayers declared income in the range of 180K-190K CHF in the years 2004 and 2005. The red vertical line indicates the regressive threshold. Panel A) includes all taxpayers, Panel B) includes only taxpayers who had moved to Obwalden before 2006 and who were present for least 4 years. *Source*: Personal income and wealth tax data canton Obwalden, 2001–2010.



(a) Index (2005 = 100)



(b) Sum

Figure E3: Event study graphs of income sum in the treatment and control groups

Note: The figure shows the evolution of the sum of different income components for those in the treatment group (income above the regressive threshold) to those in the control group (60–95% of the threshold). Panel a) compares the index of this sum relative to 2005 among the two groups. Event studies in Panel b) are based on the annual income sum of each income component within each group. The red vertical line indicates the introduction of the regressive tax scheme in 2006, the green line indicates the introduction of the flat rate tax in 2006. *Source*: Personal income and wealth tax data canton Obwalden, 2001–2010.

Table E1: ETI-estimates: GMM IV regressions of taxable income on net-of-tax rate

	(1) All	(2) High income	(3) Treated	(4) Control: 60-95%	(5) Self-employed	(6) Double earners	(7) Children	(8) Retirees
Panel A: no individual FE								
ETI (e)	0.823***	1.329**	0.994	2.082**	1.252	0.955*	1.557***	0.145
	(0.248)	(0.575)	(0.942)	(1.006)	(1.102)	(0.573)	(0.535)	(0.227)
Obs.	65,669	3,375	1,422	2,935	3,846	18,534	17,383	13,791
R^2	0.033	0.076	0.083	0.089	0.035	0.026	0.028	0.035
No. of clusters	13906	666	290	556	1008	4362	4206	3257
Panel B: including individual FE								
ETI (e)	0.207	1.031**	0.691	1.396*	0.311	-0.00554	0.502	-0.161
	(0.211)	(0.509)	(0.862)	(0.777)	(0.974)	(0.513)	(0.455)	(0.232)
Obs.	63,826	3,309	1,386	2,892	3,624	17,848	16,676	13,213
R^2	-0.000	0.001	0.006	-0.002	0.000	0.000	-0.000	0.001
No. of clusters	12063	600	254	513	786	3676	3499	2679

*** p<0.01, ** p<0.05, * p<0.1. Robust standard errors clustered at the individual level in parentheses.

Note: The table reports estimates of the elasticity of taxable income (ETI) for different population groups. The high-income sample (Column 2) includes all taxpayers who belonged either to the treatment or the 60-95% of the income threshold control group at least once over the 2001–2010 period. The sample in Columns 3 and 4 includes only those who were ever in the treatment or 60-95% income control group, respectively. All samples exclude low-income taxpayers (defined as individual taxpayers with real annual taxable income <20K CHF and married taxpayers with annual income <35K CHF). All estimations include municipality and year dummies, dummies for married, double earners, children, self-employment, and retirees, as well as controls for age and age squared of the main taxpayer. All specifications further control for base-year income (lagged 3 years) and a dummy for each decile of 3-years lagged base-year income. *Source*: Personal income and wealth tax data Obwalden, 2001–2010.

Abbreviations

The 26 Swiss Cantons

ZH Zurich
BE Bern
LU Lucerne
UR Uri
SZ Schwyz
OW Obwalden
NW Nidwalden
GL Glarus
ZG Zug
FR Fribourg
SO Solothurn
BS Basel-Stadt
BL Basel-Landschaft
SH Schaffhausen
AR Appenzell Ausserrhoden
AI Appenzell Innerrhoden
SG St. Gallen
GR Grisons
AG Aargau
TG Thurgau
TI Ticino
VD Vaud
VS Valais
NE Neuchâtel
GE Geneva
JU Jura

Acronyms

2SLS two-stage least squares
IV instrumental variable
DiD Difference-in-Differences
ETI elasticity of taxable income
FTE full-time equivalent