Intertemporal Labor Supply Substitution? Evidence from the Swiss Income Tax Holidays*

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Abstract

This paper estimates the intertemporal labor supply (Frisch) elasticity of substitution exploiting an unusual tax policy change in Switzerland. In the late 1990s, Switzerland switched from an income tax system where current taxes were based on the previous two years' income to a standard annual pay as you earn system. This transition created a two-year long, salient, and well-advertised tax holiday. This change occurred both for the federal and local income taxes. Swiss cantons switched to the new regime at different points in time during the 1997–2003 period. Exploiting this variation in timing and using population-wide administrative social security earnings data matched with census data, we identify the Frisch elasticity. We find significant but quantitatively small responses of earnings with a Frisch elasticity of .05 overall. Some groups, such as high wage income earners and especially the self-employed display larger responses with Frisch elasticities of .1 and .27. We find no effects along the extensive margin at all and almost no effects on hours of work suggesting that responses are driven primarily by tax avoidance rather than real labor supply. Therefore, our estimates constitute upper bounds for the labor supply Frisch elasticity.

Keywords: Tax holidays, Labor supply, Frisch elasticity, Intertemporal labor supply elasticity, Income shifting, Income taxes, Tax avoidance

JEL: E65, H24, H26, J22

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1 Introduction

The intertemporal labor supply elasticity of substitution—traditionally called the Frisch elasticity—measures how much more people are willing to work when their wage increases temporarily. This elasticity plays a key role in amplifying the effects of technological shocks on labor supply and economic activity in calibrated macro real business cycle models. The intuition is the following. Suppose there is a temporary negative technological shock which reduces productivity (relative to trend). This shock reduces wages temporarily. If the Frisch elasticity is large, relatively modest technological shocks can translate into large labor supply responses and hence explain why downturns are accompanied by large falls in employment. Indeed, most calibrated macro real business cycle models require a very large Frisch elasticity in excess of one to generate realistic quantitative predictions (see e.g., King and Rebelo, 1999).

However, identifying the Frisch elasticity is empirically challenging as it requires exogenous time variation in net wage rates unrelated to labor supply or human capital accumulation decisions. As a result, recent studies have often used specific occupations—such as taxi drivers—where exogenous variation in wages is more plausible (see Reichling and Whalen, 2012; Chetty et al., 2013, for recent surveys and discussions). Using tax variation has long been a traditional source of exogenous variation to estimate *static* labor supply elasticities (see e.g., Keane, 2011, for a recent survey). However, tax variation typically does not provide temporary variation needed to estimate the Frisch elasticity.[1] In this paper, we break new ground on this important issue by exploiting an unusual tax policy reform in Switzerland that generated large, salient, and well-advertised one- or two-year long income tax holidays staggered across the 26 Swiss cantons, which are the member states of the Swiss Confederation. The tax holiday, which exempts earnings from income taxation temporarily in the local economy (the cantonal level), is close to being the ideal experiment to estimate the Frisch elasticity. This has two additional advantages relative to previous work. First, our estimates are representative of the total population and do not focus on very specific—and potentially more elastic—occupations (such as taxi drivers). Second, we can identify the Frisch on an annual frequency, which is the relevant time frame for business cycle frequency (occupation-specific studies use much higher—often daily—frequencies).

In the late 1990s and early 2000s, Switzerland switched from an income tax system where current taxes were based on the previous two years' income to a standard annual pay as you earn system. For example, in the old system, income taxes due in years 1997

[1] An important exception is Bianchi et al. (2001) who use a one year income tax holiday in Iceland. We discuss the link between this study and ours in detail below.

and 1998 were both based on the average income over the two preceding years 1995 and 1996. This system of owing taxes based on prior year incomes was common in income tax systems before pay as you earn tax systems were put in place.[2] In the new system, taxes on income earned in year t are collected during year t with a tax return filed in year $t+1$ and an adjustment made through a tax refund or an extra tax payment if taxes already collected are not exactly equal to taxes owed.[3] This is the system now used in virtually all advanced economies today.

Swiss cantons transitioned in three waves in 1999, 2001, and 2003. Two cantons transitioned early in 1999, most cantons transitioned in 2001, and three cantons transitioned late in 2003. The transition happened for federal, cantonal, and municipal income taxes simultaneously in each canton. To illustrate the mechanism, take the example of the canton of Thurgau as depicted on Figure 1, which transitioned in 1999. In 1997 and 1998, income taxes (at the federal, cantonal, and municipal levels) were paid based on the average of 1995 and 1996 incomes. In 1999, income taxes (at the federal, cantonal, and municipal levels) were based solely on 1999 incomes. In 2000, income taxes were based solely on 2000 incomes, etc. To avoid double payment of taxes in 1999 and 2000, no tax was ever assessed on 1997 and 1998 incomes (which would have been paid in 1999 and 2000 under the old system). Therefore, this transition created a two-year long income tax holiday for years 1997 and 1998. Hence, cantons transitioning in 1999 had a tax holiday for years 1997-1998; cantons transitioning in 2001 had a tax holiday for years 1999-2000; and cantons transitioning in 2003 had a tax holiday for years 2001-2002. An extra source of variation comes from the fact that some cantons used an annual system of assessment (instead of biennial) for the cantonal and municipal taxes. For these cantons, the transition generates only a *one*-year long tax holiday for local taxes.[4]

Local income taxes (defined as cantonal plus municipal) make up a substantial share of a taxpayer's tax bill in Switzerland: they account for about 5/6 of total income taxes, with the remaining 1/6 coming from the federal income tax. There is significant variation in the level and progressivity of local income taxes both across cantons but also within cantons as each municipality sets its own tax level as a percent of the cantonal tax.

[2]The US transitioned in 1943, the UK transitioned in 1944. France is the last holdout among advanced economies and is scheduled to transition in 2019. The Swiss system was further particular in that it used an average of two years to compute base income (instead of using a standard annual income base).

[3]In both the old and the new system, Switzerland does not use withholding at source and individuals are typically required to pay estimated taxes in quarterly installments (as is done in the US for income not subject to tax withholding such as self-employment income).

[4]Take the example of Zurich which transitioned in 1999. In 1998, local taxes were based on 1997 incomes. In 1999, local taxes were based on 1999 incomes, so that the tax holiday for local taxes was just for 1998.

Therefore, this rich variation in timing and intensity of the tax holiday across localities in Switzerland provides a unique opportunity to identify its effects on individual behavior and estimate the Frisch elasticity. The tax holiday timing was discussed at length in the press well before the transition took place, making it salient to the public, particularly for the last 2 waves of transitioning cantons. Various press articles discussed how working and earning more during the tax holiday (relative to later years) was fiscally advantageous. The tax holiday increased the net-of-tax rate (defined as one minus the marginal tax rate) by about 25–30% on average. Hence for example, with a Frisch elasticity of one, which is toward the low end of estimates used in macro-calibrations, we should expect a 25–30% increase in earnings.

To carry out our study, we use population-wide social security earnings records matched to 2010 Census data covering a long range of longitudinal annual earnings from 1990 to 2010. These data allow us to obtain precise estimates exploiting fine geographical variation. Our strategy relies on a simple difference-in-differences method where we compare earnings outcomes over time and across localities that transitioned at different times. Because we have large data, we obtain smooth and precise time series for a number of earnings outcomes even when restricting the data to specific earnings quantiles or demographic groups. We find that series for different cantons move in a very similar way over time pre- and post-reform giving us confidence that the parallel trend identification assumption holds. The graphical time series evidence shows clearly that spikes in earnings arise during the tax holidays for some sub-groups, and can then be confidently interpreted as the causal effect of the tax holiday. Our analysis is limited to labor income because we do not have data on capital income (as the cantonal tax administrations did not systematically collect data on incomes earned during the tax holidays). Our main analysis focuses on prime age individuals aged 20 to 60.[5]

We obtain five main results. First, we do not find any evidence of a response along the employment margin (extensive margin). This implies that the Frisch elasticity is very small along the extensive margin. Second, there is a small aggregate response of wage earnings with an implied Frisch elasticity of .05 for aggregate wage earnings. The responses are concentrated among the top 5% of the wage earnings distribution with a Frisch elasticity around .1 for this group. There is no statistically significant response below the top 5%. We do not find responses along the hours of work margin either. Third, there is a larger response of self-employment earnings that is present at all earnings levels (and not just the top), the Frisch elasticity for self-employment earnings is around .3-.4. Fourth, effects are actually larger for men than for women and even married women,

[5]For the elderly, tax incentives interact with retirement decisions and the incentives created by the retirement system.

in contrast to the standard findings in the labor supply literature. Fifth, most of these responses are visible for the last wave of transitioning cantons with tax holidays in 2001-2002. Responses for earlier transitions such as 1997–1998 or 1999–2000 appear to be much muted. This latter effect might be due to learning as it might take time for the public to understand tax holidays and how to respond to them. Overall, our evidence suggests that responses are driven primarily by tax avoidance rather than real labor supply. As a result, our paper shows that Frisch real labor supply channel due to labor market-wide temporary changes in net-wage-rates is quantitatively very modest and particularly so along the extensive employment margin. This casts doubt on quantitative calibrations of macro models that use very large Frisch elasticities to account for the large employment fluctuations over the business cycle.

This paper is organized as follows. Section 2 reviews the prior empirical literature on the Frisch elasticity. Section 3 describes the reform and the variation we exploit. Section 4 describes the data we use. Section 5 describes our empirical results. Section 6 concludes. The appendix includes more details on the data we use as well as a number of robustness checks that we only mention briefly in the main text.

2 Literature Review

There is a large literature in both micro- and macroeconomics estimating the Frisch elasticity. Reichling and Whalen (2012) provide a recent survey. The labor economics strand of the literature adopts a micro-approach while the macroeconomics strand adopts a macro-approach. Chetty et al. (2013) discuss in detail the macro and micro evidence and show that calibration based macro estimates generate much larger elasticities than micro based elasticity estimates along the extensive margin. They also provide estimates of comparable Frisch elasticities along the extensive margin of micro studies (Table 1, Panel B of their paper) that we discuss below.

The macroeconomic literature still uses very large Frisch elasticities when calibrating dynamic models of labor supply. For example, workhorse real business cycle models such as King and Rebelo (1999) or New Keynesian dynamic stochastic general equilibrium models such as Smets and Wouters (2007) or Del Negro et al. (2015) are calibrated using Frisch elasticities well exceeding 1. Similarly, the infinitely lived household models that are standard in much of the macro literature, the period utility function is often assumed to be log linear in consumption and leisure. If the representative household spends one-third of the time in market work, the implied Frisch elasticity is 2 (Keane and Rogerson, 2015). While these literatures recognize that the empirically estimated Frisch

elasticities along the intensive margin is much smaller, they argue that the elasticity along the extensive margin might be much larger, particularly when extending the focus to the full working age population (see e.g. Fiorito and Zanella (2012); Keane and Rogerson (2015); Peterman (2016) for three recent studies).[6] Our analysis allows us to estimate a macro-level elasticity and decompose effects into intensive and extensive margins.

The vast majority of studies using the micro-approach exploit variation in wages– rather than taxes—following the pioneering study by MaCurdy (1981). They find a range of estimates going from 0 to around 1. However, this wage variation is rarely exogenous and is typically connected with human capital accumulation decisions. For example, a person may work little temporarily in order to build up human capital possibly confounding inter-temporal substitution effects. Hence, in this review, we focus on reduced form studies that use quasi-exogenous sources of identification, and hence are closest to our study.[7]

High frequency studies. Some recent studies have used quasi-exogenous and experimental variation in wage rates for specific groups of workers to study intertemporal labor supply decisions. The studies typically look at labor supply at a very high (often *daily*) frequency and are hence less relevant for business cycle analysis than our annual frequency analysis. In the case of taxi drivers, Camerer et al. (1997) find a negative Frisch elasticity which is not consistent with rational intertemporal behavior but could be explained by income targeting on a daily basis. These findings, however, have been challenged by Farber (2005, 2015), who reports positive Frisch elasticities for Taxi drivers between .4 and .8. Oettinger (1999) finds that stadium vendors' labor supply is quite responsive to variations in demand. Fehr and Goette (2007) provide randomized variation to wages of cycling messengers and find a sizable Frisch elasticity slightly above one. Similarly, Stafford (2015) and Giné et al. (2017) report Frisch elasticities around one for the daily labor supply of fishermen in Florida and India, respectively, mainly due to a large extensive margin elasticity. By contrast, Goldberg (2016) finds that the weekly labor supply for work on agricultural development projects in Malawi is very inelastic.

Labor demand shock. Carrington (1996) finds fairly large supply side responses to the large positive demand shock created by the construction of the Trans-Alaska pipeline in the 1970s. This supply side response is due to both immigration and increased em-

[6] Peterman (2016) also shows that the large macro-level based elasticity estimates are quite sensitive to specification.

[7] Keane (2011) provides an extensive review of structural estimates of the Frisch elasticity in the labor literature.

ployment in the local population, with an implied Frisch elasticity along the extensive margin of .43.

Retirement programs studies. Retirement programs can generate intertemporal variation in labor supply incentives. Brown (2013) uses a bunching approach and kink variation in benefits by tenure at retirement in the California teachers' pension system. She estimates a Frisch elasticity along the extensive margin of .18. Manoli and Weber (2016) exploit compelling variation in severance pay discontinuities by tenure in Austria and find significant responses with an implied Frisch elasticity around .25 along the extensive margin.

Tax and welfare reform studies. Ziliak and Kniesner (1995), Saez (2003), and Looney and Singhal (2006) use anticipated changes in tax rates associated with changes in tax bracket and family composition to estimate intertemporal labor supply elasticities and find fairly large responses, with implied Frisch elasticities in the range .5–1 (along the intensive margin). Card and Hyslop (2005) analyze a randomized experiment providing three-year long subsidies for work to welfare recipients in Canada and find significant responses with an implied Frisch elasticity at .38 along the extensive margin. As Dokko et al. (2008) argue, this type of tax or transfer variation mixes up both substitution and income effects, particularly if individuals face credit constraints or are partly myopic in their decision making.

A key advantage of our setting compared to these studies is that the tax holiday is a large and salient change. Furthermore, the reform does not create an income effect for myopic individuals as income taxes are due every year and there is no gap in income tax collection (the tax holiday arises precisely so that individuals are not double taxed in any period, appendix figure A2 shows that aggregate income tax collections are smooth across the tax holidays). Hence, our set-up cleanly identifies substitution effects. Finally, our set-up identifies the impact of a market wide change in wage rates (instead of a purely micro effect), hereby coming closer to the ideal experiment of an economy wide fluctuation in technological change.

Iceland tax holiday study. Closest to our study, Bianchi et al. (2001) exploit the one-year tax holiday in Iceland produced by a transition from an income tax based on prior year income to a pay as you earn income tax in 1987. Bianchi et al. (2001) report large effects with an implied Frisch elasticity of .42 along the extensive margin. In contrast to Switzerland, the tax holiday in Iceland applied uniformly with no geographical or time

variation across the country. Therefore, it is difficult to disentangle the tax effects from the business cycle effect in this study as the tax holiday corresponded to the peak year of the business cycle in Iceland (see their Figures 1 and 2, p. 1565). In contrast, as tax holidays in Switzerland happen at different times in different cantons, we can use other Swiss cantons as a counterfactual to control for the business cycle at the country level. Another advantage of our study is that we use population-wide data while Bianchi et al. (2001) relied on a much smaller sample of about 9,300 individuals.

3 The Tax Holiday Reform

3.1 The Swiss Income Tax System

Individual income taxes in Switzerland are quantitatively large and represent about 1/3 of total tax revenue or about 9% of the Swiss GDP. Income taxes in Switzerland are levied at the federal, cantonal, and municipality level. The federal income tax is set by federal law, is uniform across cantons, and represents about 1/6 of total income tax revenue. Local taxes which include cantonal and municipal taxes are very large and represent about 5/6 of income tax revenue.[8] Cantonal taxes are set by cantonal law and municipalities simply apply a multiplier to the cantonal tax to determine municipal taxes. The cantons set their income tax schedule freely and municipalities choose their multiplier freely. This creates large geographical variation in tax burdens (conditional on income) both across and within cantons.[9] The federal tax is more progressive with very low tax rates on low and middle-income taxpayers while local taxes often impose significant tax burdens through most of the income distribution. The top marginal tax rate combining all income taxes is typically in the 30-40% range (although it can go as low as the low 20s and go as high as the mid-40s in some municipalities).[10]

Married couples file together and are taxed based on total family income so that secondary earners face significant tax burdens, particularly if the income of the primary earner is high. The income tax base includes both labor and capital income although this

[8]These statistics are taken from OECD (2016) and refer to year 1996 which is the year just before the reforms we study take place. Statistics for 2015 (the latest year available) are fairly similar.

[9]Indeed, the Swiss federation comes perhaps closest to the ideal Tiebout model of local public finance with many studies analyzing tax competition and tax induced mobility across municipalities and cantons. Liebig et al. (2007); Schmidheiny (2006); Brülhart et al. (2016); Martinez (2016) study mobility across Swiss Cantons in response to local income or wealth taxes. Kirchgassner and Pommerehne (1996); Eugster and Parchet (2018); Parchet (2018); Brülhart and Parchet (2014) study tax competition in the setting of tax rates by municipalities and cantons.

[10]Appendix Figure A1 depicts the average income tax rate (summing across federal and local income taxes) by municipality for a single taxpayer with an annual income of 100,000 CHF (this is about the 90th percentile of the labor earnings distribution among workers) as of 1999.

study will solely focus on labor income (including wage earnings and self-employment earnings) due to data availability constraints (incomes made in tax holiday years did not have to be reported to the tax administration). The cantonal tax administrations are responsible for the collection of the taxes at all three levels and taxpayers only file one tax return for all three taxes.

Old tax system. Prior to the tax reform we are exploiting in this paper, Switzerland applied a biennial retrospective income tax system. For example, taxes paid in years 1997 and 1998 were based on average income in 1995 and 1996. In 1997, a tax return would be filed reporting incomes in 1995 and 1996. From this tax return, tax liability would be determined for both year 1997 and year 1998 (and identical in 1997 and 1998) so that taxpayers only had to file a tax return every second year. Tax payments were typically made in quarterly installments each year. The drawback of this system is that if the economic situation of the taxpayer changes (due to marriage, divorce, job loss, etc.), the tax due might not correspond well with current income.[11]

New tax system. In the new system, Switzerland uses a standard pay as you earn annual income tax system whereby incomes earned in year t are taxed in year t through estimated payments. Individuals pay estimated taxes typically in quarterly installments (with some variation across cantons). In contrast to other countries, Switzerland has not adopted tax withholding at source under the new system. The fact that Switzerland does not have tax withholding on earnings makes income taxes quite salient as individuals pay installments directly to the government. After the end of year t, an income tax return is filed in year $t+1$ which lists all income sources and computes the exact tax. Any difference between the exact tax owed and the taxes already paid during year t generates a tax refund or an extra tax payment. This pay as you earn system is the standard system used for individual income taxation in virtually all advanced economies at the present time.

3.2 Description of the Tax Holiday Transition

Discussions about switching to a modern pay as you earn annual income tax system had taken place since the 1980s in the Swiss government. In December 1990, two federal

[11] A few cantons, including the large canton of Zurich, were actually using an annual period of assessment (instead of biennial) for the cantonal and municipal taxes. In these cantons, incomes earned in year t were taxed in year $t+1$ and returns had to be filed every year. The federal tax was still biennial in these cantons. One canton, Basel, had always had a standard pay as you earn income tax system for its local taxes and hence did not need to transition except for the federal tax.

laws were passed encouraging (but not forcing) cantons to make the transition from the old system to the new system by 2001 and allowing the federal income tax to change alongside with cantonal taxes.[12] However, the cantons were free to adopt the new system whenever they wanted. Two cantons, Zurich and Thurgau decided to switch early in 1999 while most cantons waited until 2001. Three cantons were not yet ready by 2001 and hence postponed the transition to 2003.[13] Importantly, when a canton decided to transition in a given year, the transition applied to all taxes at the federal, cantonal, and municipal levels.[14]

How does the transition generate tax holidays? Suppose a canton wants to transition in 1999. This specific example is illustrated on Figure 1. In 1997 and 1998, income taxes under the old system are based on the average income for years 1995 and 1996. In 1999, income taxes have to be based on 1999 incomes. This means that incomes earned in 1997 and 1998 are never taxed, hereby creating a two-year long tax holiday. Taxpayers do pay taxes every year during the transition but no tax is ever paid on the incomes for the two years before the transition. All cantons specified that the transition would indeed create tax holidays and that only extraordinary incomes earned during the holiday would be taxable. Extraordinary income included one-time lump-sum payments, irregular capital incomes, lottery winnings, and extraordinary business incomes due to accounting changes. Importantly, for labor earnings, income increases due to promotions, job changes, or more hours worked, were not considered extraordinary income.[15] Symmetrically, extraordinary deductions made during the holiday period would be deductible against income made outside the tax holiday period, typically in the year just after the holiday. In sum, any real labor supply response (and corresponding compensation) was not extraordinary income and hence was fully exempt during the tax holiday. Some tax avoidance responses were still possible. For example, tax-exempt contributions to pension plans could be postponed during the tax holiday and deferred to after the tax holiday or moved forward to before the tax holiday.

As mentioned above, a few cantons (including Zurich) used an annual assessment period (instead of biennial) for their cantonal and municipal taxes. For such cantons,

[12]The two laws were the cantonal tax harmonization law (StHG) which was scheduled to become effective on January 1st, 1993 and the new federal tax law (DBG) scheduled to become effective on January 1st, 1995.

[13]Due to the biennial structure of the old system, the change could only take place in an odd year such as 1999, 2001, 2003. No canton was ready to consider switching in 1995 or 1997.

[14]Hence, the federal tax was not uniform across cantons during the transition as cantons transitioned during different years. This departure from uniformity was allowed by the new federal tax law (DBG) enacted to encourage the transition.

[15]Bonuses and shared profits were not considered extraordinary profits if they were specified in the contract and had been paid in prior and / or later years as well.

there is a *single* tax holiday year for local taxes and two tax holiday years for the federal tax. Let us illustrate this with the case of Zurich that transitioned in 1999. In 1997, local taxes in Zurich are based on 1996 incomes while federal taxes are based on the average of 1995 and 1996 incomes. In 1998, local taxes are due based on 1997 incomes while federal taxes are again based on the average of 1995 and 1996 incomes. In 1999, both local and federal taxes are based on 1999 incomes. Hence, 1997 and 1998 are tax holiday years for federal taxes but only 1998 is a tax holiday for local taxes. Hence, the tax holiday for local taxes in Zurich is reduced to a single year. Four of the 20 cantons transitioning in 2001 are also in this situation and have a tax holiday for local taxes for only year 2000 (and 1999-2000 for federal taxes).

Figure 2 depicts a map of the cantons in Switzerland and summarizes the timing of the transition across cantons. For the federal income tax, the tax holiday was either 1997/1998 (cantons in blue), 1999/2000 (cantons in green), or 2001/2002 (cantons in brown). Generally, the tax holiday for the local (cantonal and municipal) income tax was the same as for the federal tax. However, for cantons which were using *annual* assessment periods (instead of biennial), the tax holiday for local taxes is only one year. These cantons are depicted in darker blue and darker green. One canton (Nidwalden in very dark green) had no local tax holiday at all due to a different form of transition. One canton (Basel in pink) had always had a pay as you earn local tax system and transitioned to the annual pay as you earn system for the federal tax in 1995.[16] We will use this color-coding in all our subsequent analysis.

Cantons differed in the reporting requirements for incomes earned in tax holiday years. Some cantons only collected information on extraordinary incomes (and did not require reporting of ordinary income that was tax exempt). As a result, income tax data cannot be used to study the reform. That is why we rely on social security data that provide information on labor earnings (both wage earnings and self-employment) for all years. This is also why we cannot study capital income.

Betwixt assessments and extensive margin responses. In cases of permanent entry or exit in the labor market, or migration to another canton during a tax period, the old system adopted temporary pay as you earn taxation (called betwixt assessments) until the end of the tax period. The rationale for this was to accommodate large changes in economic circumstances. Betwixt assessments disappear under the new system. We discuss in detail in appendix A.1 how this betwixt assessment system works, how it

[16]For this transition, the federal tax in 1995 was based on the maximum tax liability under the old and the new system. Therefore, this transition did not generate a clean tax holiday for the federal tax. As such, our analysis will not try to estimate the effects of this early transition in Basel.

interacts with the tax holiday, and how it affects our empirical analysis.

To summarize, the tax holiday applied along the extensive margin as long as the labor supply response was temporary such as taking a temporary job during the tax holiday. Temporary is defined as lasting less than 2 years. As the tax holiday was temporary (1 or 2 years), we would expect responses to be also mostly temporary. Our empirical analysis will capture fully such temporary responses along the extensive margin. However, in certain cases like accelerating entry in the labor force for young workers or delaying exit at retirement, the response to the tax holiday along the extensive margin would take the form of a permanent change. For permanent changes, the incentives created by the tax holiday are muted (see appendix A.1). Therefore, we focus on prime workers aged 20–60 to exclude retirement from our analysis (the legal retirement ages were 62 for women and 65 for men at that time). Importantly, the tax holiday does not generate any incentives to migrate and follow tax holidays because migration triggers a betwixt assessment whereby the person is immediately assessed on her current income right after migrating.

3.3 Salience of the Reform

Behavioral responses to the tax holiday can happen only if the public is well informed about the reform and understands that it generates a tax holiday. Hence, it is important to provide evidence on how salient the tax holiday was. Each canton could freely decide when to transition and the exact form that the transition would take. The decision was taken by cantonal legislatures. In 14 cantons, such as Zurich, the new tax laws were put to a popular referendum—either by default, by wish of the cantonal legislature, or because a party or group of individuals forced a referendum by collecting a pre-determined number of signatures. In the cases where a referendum was held, by default the resident population in a canton received voting documentation by mail. We have gathered this documentation for each canton. The voting documentation included information on the transition in an easy to understand language and in many cases the incidence of the tax holiday was further explained by a graphical illustration (see Figure 3 for an example). It also listed what was classified as extraordinary incomes (expenses), which were subject to taxation (deductions) even during the holiday. In about half of all cases, the votes took place during the first tax holiday year (see Figure 4). In all cases, the vote was always strongly in favor. Turnout ranged between 26 and 60% (see appendix Table A1 for complete details on the vote timing and turnout by cantons). However, the actual referendum or legislative vote was the last step in a longer process. In the cantons where there was no vote, the final decision on the transition hence tended to take place before the beginning of the holiday. The first drafts for the reform, including the date,

were usually discussed 3–4 years before the transition. Typically, the transition was in the public debate for many months before the decision was officially taken through the referenda or legislature votes. In most cases, the official final decision came about 1.5 years before the beginning of the transition year. Hence, for two-year long tax holidays, the public was always informed in advance for the *second* year of the tax holiday. The public was typically officially informed in the middle of the first tax holiday year although the public debate often started before the first tax holiday year. In summary, we expect more information (and hence larger behavioral responses) for the second year of the tax holiday. Let us describe in more detail the transition process in each of the three waves of cantons depicted on Figure 2.

Early transitions. Two cantons, Zurich and Thurgau transitioned early in 1999. Zurich held a popular referendum on transitioning in 1999 on June 8, 1997. As Zurich has a single 1998 tax holiday year for cantonal taxes, the public was officially informed about the 1998 tax holiday more than 6 months before the start of 1998, leaving time to anticipate and prepare for the reform. Thurgau decided its transition in 1999 on June 30, 1997. This means that Thurgau residents knew for sure by the middle of 1997 that 1997 and 1998 would be tax holiday years. Hence, we should expect a larger behavioral response for 1998 than for 1997 in Thurgau.

2001 transitions. Most cantons were expected to transition in 2001. These decisions were typically made during calendar year 1999, with votes held into calendar year 2000. This implies that in many cases the information was made official during the first tax holiday year of 1999 and before the start of 2000, the second tax holiday year. Most of the referenda held in 2000 were mandatory referenda, and the large share of yes votes show that the new tax laws were uncontested. Taxpayers could therefore expect the new system to be put in place. Hence, we should expect a larger response in the second tax holiday year. As Zurich and Thurgau had already transitioned with tax holidays, we expect that the public was even better informed for this large group of cantons.

2003 transitions. The three cantons VD, VS, and TI which transitioned late in 2003 decided to transition at this date typically in 2000 or 2001. The reason these cantons transitioned late was mostly that their information technology systems were not yet ready. Legally, these cantons claimed that they needed to make some changes in their cantonal laws to incorporate the new requirements and that due to some of the changes the transition period was extended until January 1 2003. As most cantons had already

transitioned, the nature of the transition and the tax holidays it creates is likely to have been even more salient for these cantons.

Press coverage. Another way to assess salience is to examine press coverage of the transition and in particular how often tax holidays were mentioned.

The top panel of Figure 5 shows an illustration of a press article explaining the tax reform and the tax holiday it creates. The article was published on February 16, 2001 for the canton of Valais that transitioned in 2003 and hence had a tax holiday for years 2001 and 2002. Hence, as early as the beginning of the first holiday year, the public was clearly informed that incomes earned in 2001 and 2002 would not be taxed.

The bottom panel shows the number of press articles mentioning the word "Bemessungslücke" (blank year) and the French term "brèche fiscale", or other expressions used to refer to the reform in German and French[17] by year and most major newspapers.[18] The figure displays four series: (1) the series in blue is for two Zurich based newspapers, (2) the series in light green for three Bern and Lucerne based newspapers, (3) the dashed series in dark green for two Geneva and a Solothurn based newspapers, (4) and the series in brown for three Vaud and Valais based newspapers. The tax holiday for Zurich is depicted in blue, the tax holiday for Bern and Lucerne is depicted in light green, the tax holiday for Geneva and Solothurn is depicted in dark green, and the tax holiday for Valais and Vaud is depicted in light brown. The figure shows that press interest in the tax holiday peaked during the years when the actual tax holidays happened (i.e., in advance of the transition year which is the year immediately after the tax holidays). Interestingly, the figure shows that these peaks corresponded to the regions where the blank year was in place. This suggests that at least for the second blank year and especially for the second wave of the reform (1999/2000), salience can be assumed to have been large.

It is important to recognize that the fact that the transitions were formally passed by the cantonal legislatures and discussed in the press does not automatically insure that all taxpayers were perfectly informed. Many people do not follow local legislative activity nor read the press systematically. Indeed, recent empirical work has shown that taxpayers often have imperfect information about tax systems even when tax systems have been

[17] These are "Gegenwartsbesteuerung, Gegenwartsbemessung, postnumerando, pränumerando, brèche de calcul, trou de taxation, taxation bianuelle, and taxation annuelle".

[18] We constructed these graphs by scraping the newspaper archive "Swissdox", which contains a full text archive of most newspapers in Switzerland. The sample is restricted to large daily newspapers whose archive covers the relevant time period (i.e. starts in 1998 or earlier). The following German- and French-speaking newspapers fulfill these sample restrictions and are based in the regions shown in the graph: 24 Heures (since 1997), Berner Zeitung (since 1998), Der Bund (since 1994), Le Matin (since 1997), Le Temps (since 1998), Neue Luzerner Zeitung (since 1998), Neue Zürcher Zeitung (since 1993), Solothurner Zeitung (since 1996), Tages-Anzeiger (since 1995), and Tribune de Genève (since 1997).

fairly stable (see e.g., Fujii and Hawley (1988)). However, the most elastic taxpayers are those who have the most to gain from learning about the tax system and hence should have the strongest incentives to get informed. Inelastic taxpayers do not respond to changes in tax rates and hence have no need to learn about the tax system. Hence, if elastic taxpayers are well informed, our estimates still capture most of the "full information" elasticity that would prevail if everybody were perfectly informed. Furthermore, the tax holiday was a simple concept to understand: earnings during the tax holiday are free of all income taxes. This does not require understanding the intricacies of the income tax code nor the marginal tax rate schedule.

3.4 Expected Behavioral Responses

What behavioral responses should we expect from this tax holiday reform?

Quasi-pure intertemporal substitution effects. The tax holiday generates substitution price effects as income earned during the tax holiday escapes the income tax. On the extensive margin, the cut in the average tax rate is around 11 points on average (see Figure 14, top panel). On the intensive margin, the cut in the marginal tax is even larger, around 20-25 points on average (see Figure 14, bottom panel). The cut in tax rates is lower for lower income individuals due to the progressivity of the tax system. On an annual basis, there is no direct income effect as income taxes are due every year. Indeed, the reason for the tax holiday is precisely to avoid double taxation during the transition. Aggregate annual income tax collections do not display any discontinuity during the tax holiday and transition years (see appendix Figure A2). Therefore, the tax reform comes very close to a pure substitution effect that can identify the Frisch elasticity.[19]

Real labor supply responses. The tax holidays should induce individuals to work more during the tax holiday both at the extensive and intensive margins.

On the extensive margin, the tax holiday makes working more attractive and could induce some individuals to work. This effect should be strongest for secondary earners as they are traditionally seen as more elastic and the average tax rate on secondary earners is significant due to joint taxation of married couples. In principle, responses along the extensive margin should be temporary (as the tax holiday incentive is temporary). For temporary responses, the tax holiday applies fully (see our discussion above).

[19]If individuals are fully myopic and make labor supply decisions on a purely annual basis as in the standard static labor supply model, then the tax holiday creates a pure substitution effect and no income effect as the burden of taxation remains present in each year. In this case, the tax holiday variation identifies the compensated static labor supply elasticity.

On the intensive margin, individuals might decide to work more and earn more as the marginal income tax rate on extra earnings is zero during the tax holiday. Individuals could work overtime, take an extra job or add work through self-employment, or cut down on unpaid vacation. Self-employed individuals are likely to have more flexibility in adjusting their labor supply and hence we should expect a larger response among the self-employed.

Using the conventional labor supply and labor demand competitive model, if the labor supply response is strong and labor demand is not perfectly elastic, then the wage rate could fall. In that case, this attenuates the labor supply response. Demand responses should lead to a fall in the wage rates. Our main analysis focuses on earnings (wage rates times hours of work) as social security data record only earnings and not wages and hours of work separately. However, it is possible to use the wage structure surveys (described in detail below) to examine wage rates specifically. If anything, our evidence suggests that hourly wages increase as a response to the tax holiday, implying no visible demand driven wage effects. This is perhaps not surprising in light of the quite modest supply responses we obtain in aggregate.

Tax avoidance responses. Individuals might also be able to shift income into the tax holiday years (at the expense of surrounding years) through tax avoidance. This could happen for example if workers have flexibility regarding the payment of their labor income. In principle, such shifting is easiest for the self-employed. Therefore, we will analyze self-employment earnings specifically and separately from wage earnings. Alternatively, workers might shift tax exempt contributions to pension plans (called pillar 3 pensions in Switzerland) away from the tax holiday year and into surrounding years (our earnings data are always before pension contributions and we unfortunately cannot observe pension contributions at the individual level).[20] Individuals might also negotiate with their employer a higher pay during the tax holiday (and correspondingly lower pay either before or after). For example, bonuses might be retimed into the tax holiday year. We will assess whether labor earnings are depressed either just before or just after the tax holiday to detect such time shifting effects, and analyze bonuses specifically using the wage survey.

[20]There is unfortunately no data on total pension contributions by canton that we can exploit. However, it is possible to examine country level contributions to pillar 3 pension as shown in appendix Figure A3. This evidence suggests that there was a clear dip in pillar 3 contributions in years 1999 and 2000 when most cantons had their tax holiday.

4 Data

We use two main data sources for our empirical analysis. We defer to the online appendix the complete description of the data and provide a short summary in this section.[21]

Matched SSER-Census Data. Our main dataset merges the register-based 2010 population census of Switzerland with longitudinal social security annual earnings records (SSER) covering the period 1981–2010. Both datasets cover the full population. In the SSER data, employed or self-employed individuals generate one record per job per year that details the starting and ending month of an employment relationship along with the total earnings over that time period. Labor earnings are uncapped, and include variable pay components such as bonuses and stock options. We match these records to census data because the social security data do not contain geographical information which is key for our empirical design.[22] Panel A in Table 1 presents descriptive statistics of the matched data pooling all years from 1990 to 2010.

Because virtually everybody generates a record at some point in his or her life, our matched data set contains 98% of the resident population aged 20–60 in 2010. As we move back in time, the sample coverage of persons aged 20–60 gets slightly smaller because certain individuals that lived in Switzerland in these earlier years died or emigrated and hence are not present in the 2010 census. Figure A5 in appendix shows that our matched data set contains 91% of all individuals aged 20–60 living in Switzerland in 2000, the time around which the reforms we analyze took place.

In appendix Figure A6, we compare the employment rate of 20 to 64 year-old Swiss men and women in our data with the employment rate of these groups according to the labor force survey described below. We observe that the employment rates are slightly higher in our data than they are in the labor force survey. This is likely due to the fact that people with very low but positive earnings have a social security earnings record but may not be recorded as participating in the labor force in the labor force survey, among others because the surveys only refer to the fraction of individuals employed in the second quarter of a specific year.

Our matched dataset has four drawbacks that should be noted. First, the earnings records in 1998 are incomplete due to errors in recording in some of the local social security offices. The share of wage earners for which records are missing is about 5–6%. The missing records prevent us from analyzing aggregate outcomes in 1998, as the

[21] We also offer in appendix some analysis based on the Swiss labor force survey (SLFS), the equivalent of the US Current Population Survey.

[22] Unfortunately, the 2000 Census, which is closest to the time of reforms we analyze, does not have social security numbers and hence cannot yet be matched to the earnings data systematically.

problem of missing records is not equally distributed across cantons. Second, the register-based census 2010 does not contain information on some variables of interest normally available in census data such as schooling/education, occupation, or number of children. Third, we only observe the family characteristics of individuals as of 2010. This is a concern for characteristics that can change over time, especially an individual's place of residence, marital status and immigrant status or citizenship. The census provides information on how these characteristics changed in the past, allowing us to reconstruct the information for years prior to 2010. Nevertheless, we have to impute some of the data points using a set of assumptions. We discuss the imputations procedures for the three variables in the appendix. Fourth, even though marital status is observed in 2010, we cannot match married spouses together even in 2010. As a result, we cannot observe the earnings level of spouses for individuals who are married. This sharply limits our ability to exploit variation in the level of spousal earnings as a source of identification.

Employer Survey (LSE). The Swiss wage structure surveys (*Lohnstrukturerhebung* LSE) have been conducted every two years by the Swiss federal Statistical Office (FSO) since 1994. They are a large stratified random sample of private and public firms with at least three full-time-equivalent workers from the manufacturing and service sectors in Switzerland.[23] They cover between one sixth (1996) and one half (2010) of total employment in Switzerland. The mandatory surveys contain extensive information on the individual characteristics of workers and provide reliable (employer-reported) information on hours worked per worker. Moreover, they contain detailed salary information broken down into individuals pay components, including bonus payments per worker. The main drawbacks of these data are that (1) they cannot be used to study the extensive labor supply margin; (2) they only provide the geographical location of the work location (and not the residence location) which creates measurement error for individuals who do not live in the same canton they work; (3) they are bi-annual and hence do not cover every single year (although the even years are always the second year of the tax holiday and hence the ones where the information is best and the expected response largest). We address the second problem by excluding zip codes where more than 25% workers stem from one of the other groups of cantons relevant in the analysis. Approximately 10% of all observations in the surveys are dropped due to this restriction. The commuting patterns by zip code are computed from the census in 2000. We use the wage structure surveys

[23]The data exclude public sector employees at the federal and local levels, as well as the agricultural sector. Additionally, we exclude the public sector (i.e. public administration, education, and health, NACE rev. 1.1. two-digit industries 75, 80, and 85) from the analysis since it is not fully covered in the early waves.

to examine how the tax holiday affected wage rates and variable pay components. Panel B in Table 1 presents descriptive statistics of the employer survey data pooling all years from 1994 to 2010.

5 Empirical Results

In this section, we present our empirical results. We divide cantons into various groups as depicted in our earlier Figure 2: (1a) 1 canton (Thurgau) which transitioned early in 1999 with tax holiday in 1997-98, (1b) 1 canton (Zurich) which transitioned early in 1999 with tax holiday in 1998 only for local taxes (and 1997-98 for the federal tax), (2a) 16 cantons which transitioned in 2001 with a tax holiday in 1999-2000 for both the federal and local income taxes, (2b) 4 cantons which transitioned in 2001 with a tax holiday in for 2000 only for local income taxes (and 1999-2000 for the federal tax), (3) 3 cantons which transitioned late in 2003 with tax holiday in 2001-02. We always use the same colors as in Figure 2 to depict each group: (1a) light blue, (1b), dark blue, (2a) light green, (2b) dark green, (3) brown. We sometimes group together groups (1a) and (1b) into a single group (1) and groups (2a) and (2b) into a single group (2).

First, we examine the levels of tax rates to establish the magnitude of the first stage generated by the tax holidays. Second, we analyze aggregate effects on employment, and earnings. Third, we zoom in on specific sub-groups by age and income groups. Most of our empirical analysis is based on the matched social security and census data that are the most comprehensive. However, we also examine additional outcomes such as hours of work, wage rates, and bonuses using the wage structure surveys. We also present a number of robustness checks.

5.1 First Stage Effect on Tax Rates

First, we examine the levels of average and marginal tax rates so that we can establish the size of the first stage in terms of tax rate reductions. Figure 14 displays the average income tax rate (top panel) and marginal income tax rate (bottom panel) averaged across workers in our sample by year and groups of cantons from 1990 to 2010. Tax rates include federal, cantonal, and municipal income taxes. The average tax rate is the total income tax divided by gross income. We treat married individuals and singles separately. We use tax rates for singles without children in case a person is single. For married individuals, we first impute household income using data on spousal income by household group from the

Swiss Labor Force Survey.[24] We then compute tax rates based on the resulting household income, using tax rates for married individuals with two children for all married persons. This approach implies that we slightly understate the actual tax burden for married couples without children, which, in turn, implies that the estimated Frisch elasticities rather represent upper bound elasticities.[25] Averages across municipalities and cantons are employment weighted. The cantons are divided in five groups based on when the tax holiday took place as described above following Figure 2. In the series, the dots corresponding to tax holidays are bigger and are blanked out (as tax holidays are called "blank years" in French and German). This graphical representation will be used in all subsequent reduced form graphs. For each of the groups, we represent the corresponding tax holiday periods using the vertical shading and the same color code.

Tax rates are naturally zero during tax holidays. Cantons with a single year tax holiday (groups 1b and 2b) also have a *federal* tax holiday the preceding year explaining the lower tax rate. Yet, the effect is small as federal income tax revenue is only 1/6 of total income tax revenue. Substantively, two points are worth noting. First, tax rates and especially marginal tax rates are fairly high for the average worker. Average tax rates are around 10–13% while marginal tax rates are around 20–25%. Obviously, the change in average and especially marginal tax rates are even substantially larger for groups with above-average incomes (such as men). Second, the graph shows that, over the period 1990–2010, the variation in tax rates (either average or marginal) due to the tax holidays dwarves other variations due to tax reforms. Hence, there is no doubt that the tax holiday reform creates very large temporary variation in tax rates and hence provides a promising natural experiment to identify the Frisch elasticity.

5.2 Effects on Employment

We start by plotting simple employment statistics by year and by groups of cantons focusing on the sample of working age individuals aged 20-60 in the relevant year. Hence, these statistics are repeated cross-sectional statistics. In all these graphs, the tax holiday years are denoted by the vertical shaded bars and we use the same color coding as in Figure 14 on tax rates. We exclude groups (1a) and (1b) which transitioned early with tax holidays in 1997 and 1998 in our benchmark results for three reasons. First, as discussed

[24] In particular, we add an estimate of spousal earnings by demographic group (defined by age, income, gender, marital status, and canton group in 2002) to each individual's labor earnings for married individuals.

[25] The bias turns out to be of limited quantitative importance, however. If we use tax rates for married couples without children for all married couples, the Frisch elasticities are only approximately 10% smaller.

above, we unfortunately do not have complete data for 1998. Second, it was not fully clear until June 1997 that 1997 would be a tax holiday so that the response in 1997 might have been muted. Third, for Zurich, the largest of the two early cantons in group 1, 1997 was a tax holiday only for the federal tax (and not local income taxes).[26]

Recall that the tax holiday applies along the extensive margin only for temporary job entries or exits as permanent job entries or exits were treated differently in the old system. Hence, these employment effects capture only temporary extensive decisions. However, as the tax holiday was temporary, we expect that most extensive responses would also be temporary.

Employment rates. Figure 7 displays the employment rates for men (top panel) and for women (bottom panel) from 1990 to 2010 in the three groups of cantons: (2a), (2b), and (3). The sample in each year is defined as all individuals aged 20-60 in the year (and who are still alive and Swiss residents in 2010, when we match to Census). The employment rate is computed as the fraction of individuals in the sample with positive earnings (either from wages or self-employment) during the year, as is common in the literature (see Chetty et al., 2013, Table 1).

Two findings are worth noting on Figure 7. First, all three groups of cantons follow remarkably parallel trends over the full period, and particularly so for men.[27] This implies that for each group of cantons, the two other groups constitute good control groups. Second, there is no evidence of any relative increase in employment rates during the tax holidays represented by the shaded areas. This implies that a temporary tax holiday does not affect labor supply along the extensive margin. To put these findings in perspective, because the cut in the average tax rate is around 12% (Figure 14), a Frisch elasticity of one along the extensive margin (a low end value of the estimates commonly used in macro calibrations) should generate an increase in employment rate of 11%, i.e. 9 points for men and about 8 points for women. This would create an enormous spike in the empirical series of Figure 7. Therefore, our very simple evidence can clearly rule out such large Frisch elasticities.

We have done two robustness checks. First, we have redefined employment as annual

[26] Appendix Figure A11 presents employment effects for the canton of Zurich using an imputation method for missing data described in appendix.

[27] The decline in the male employment rate is due in part to the way the sample is selected. Individuals need to be present in the 2010 census and hence the sample is relatively younger in earlier years and hence has a higher employment rate. We have also produced employment rates series which re-weight cohorts so that, in each year, the sample is representative of the full population in terms of the age distribution. The downward trend in male employment rates is much attenuated. These re-weighted graphs do not display any evidence of a response during the tax holidays either. We focus on the unweighted graphs for simplicity, as these demographic trends do not affect the difference-in-difference analysis.

earnings above some modest positive threshold of 10,000 CHF (instead of any positive earnings). It is conceivable that some individuals who intend to temporarily enter (or not to leave) the labor force during the tax holidays might not be able to target exactly the calendar year. Therefore, using a higher threshold for employment can help capture these effects as well. The absence of any response carries over unchanged when using the higher 10,000 CHF threshold (see appendix Figure A12 comparing the top and bottom panel). Second, we have repeated the analysis using the Swiss Labor Force Survey (SLFS), the equivalent of the US Current Population Survey (see appendix section A.2.3 for a description of the data source). The first panel of Figure A13 displays the employment rate using the SLFS. We also include the group of cantons that transitioned early. The figure is noisier due to smaller sample size but it does not display any tax holiday effects on the employment rate (consistent with our results using Social Security data).

Appendix Figure A14 zooms in on married women whose labor supply decisions are traditionally expected to be most elastic. The top panel of this figure displays the employment rate for married women by year and groups of cantons from 1990 to 2010. Married women are expected to be particularly responsive to taxes, yet, the figure does not show effects on employment.

Column (1) in Table 3 presents the quantitative estimates of the employment effects of the tax holiday based on the graphical analysis we have presented. All regressions in the table are based solely on OLS regressions using the aggregate time series presented in the graphs. This provides the most transparent and most conservative standard errors. We regress the time series for the three groups of cantons on year dummies, group dummies, and an indicator called "blank year" that is equal to one during tax holiday years: for two years in cantons that have two-year long tax holidays for cantonal and municipal taxes, and for one year for cantons whose cantonal tax holiday only lasted one year (i.e. the dark green cantons in the figures). Panel A reports effects for the full sample of adults aged 20–60. Panels B and C report effects of males and females, respectively. Panel D reports effects for married women only.

In each case, we first report the estimated level effect of the blank year on labor supply from the regression. Then, we translate the estimated effect into a percent increase, $\% \, \Delta \, y$, by dividing the coefficient by the average level of the outcome variable in the year just before the tax holiday. We then divide the percent change in the outcome by the percent change in net-of-tax wage rate ($\% \, \Delta[1-\tau]$) created by the tax holiday to estimate the implied Frisch elasticity, η^F. For each individual, $\% \, \Delta[1-\tau]$ is computed by comparing the zero tax load during the tax-free years with hypothetical average and marginal tax rates that an individual would have faced on the income during the tax-free years under

the tax system in place just prior to the tax holiday. We then average the hypothetical tax burdens during the tax holidays over all individuals with positive labor earnings in the respective population groups to estimate population-wide hypothetical average and marginal tax rates.

As can be seen in Panel A of Table 3 and visually in the top panel of Figure 14, we estimate that the tax holidays reduced the average tax from 11.1% to 0 for the total population, resulting in an increase in the average wage of $\Delta[1-\tau] = 12.5\%$. We compute the net-of-tax wage change based on the average tax rate when we look at the extensive margin (i.e. employment rates), and the marginal tax rate when we focus on the intensive margin (i.e. labor earnings, average wages, and average self-employment earnings).

The first column of Table 3 shows that employment effects are never significant and are fairly precisely estimated. For example, for the full sample (Panel A of Table 3), we find an overall employment effect of 0.0 percentage points with a standard error of .35 percentage points, implying that we can rule out a positive effect .7 percentage points with 95% confidence. The implied estimated Frisch elasticity is correspondingly very close to zero and we can rule out an elasticity larger than .07 with 95% confidence. No elasticity estimate along the extensive margin is larger than .02.

Other extensive margin effects. In appendix Table A2, we present estimates of the effect of the tax holiday on a set of further extensive margin outcomes constructed using our matched social security and census data. As before, the regressions are based on aggregate time series for the three main canton groups. The outcome in column (1) is the number of jobs per person employed. Distinct jobs are identified in the social security data based on an individual's number of different register entries with positive labor earnings in a given year. The outcome in column (2) is the number of months in employment per person employed during the year. The outcome in column (3) is the number of self-employed as a fraction of the total population. Finally, the outcome in column (4) is the number of persons moving into the respective canton group in a given year as a fraction of the total population. The tax holidays was not actually creating incentives to move due to the betwixt assessment (see above) and hence looking at migration can be seen as a placebo test. Panel A reports effects among all individuals aged 20-60. Panel B and C report effects for males and females, respectively. Panel D reports effects for married women only. We do not find statistically significant evidence that the tax holiday affected one of these outcomes for any of these groups. Therefore, the lack of responses along the extensive margin is pervasive and holds along all the dimensions we have explored.

5.3 Effects on Earnings

Figure 8 displays the average earnings (including non-workers) for men (top panel) and for women (bottom panel) from 1990 to 2010 in the three groups of cantons: (2a), (2b) and (3). The sample in each year is again defined as all individuals aged 20-60 in the year (and who are still alive and Swiss residents in 2010, when we match to Census). Hence, people with zero earnings are also included in the averages (we hence capture both extensive and intensive margin responses). Earnings are defined as the sum of wage earnings and self-employment earnings.

Three points are worth noting. First, overall, the trends are close to parallel in all three groups especially for women. Second, for men, there are clear spikes in earnings in 2000 for cantons with tax holidays in 1999-2000 or 2000 (green series) and especially in 2001-02 for cantons with tax holidays in 2001-02 (brown series). These spikes are consistent with a behavioral response to the tax change. However, the magnitude of the spikes is fairly modest, a couple points of average earnings at most. Third, for women, the spikes are largely absent suggesting a much smaller response in this group. Note that the parallel trend assumption between the light green and brown groups is excellent both pre- and post-reform and displays a very small positive earnings effect for women for the cantons which transitioned last (in brown).[28]

Next on Figure **??**, we disaggregate earnings between wage earnings vs. self-employment earnings among workers (we focus on workers as our earlier evidence ruled out extensive margin effects). Figure **??** displays average wage earnings (top) and average self-employment earnings (bottom) by year and groups of cantons from 1990 to 2010. For the top panel on wage earnings, the sample in year t includes only individuals with positive wage earnings in year t. For the bottom panel on self-employment earnings, the sample in year t includes only individual with positive self-employment earnings in year t. For wage earnings, we observe a very small response to the tax holiday but precisely estimated as the parallel trend assumption pre- and post-reform holds very well. For self-employment income, we see a much larger response for late transitioning cantons (in brown) with about 5-10% excess self-employment earnings during the tax holiday years although the effect is not quite as precisely estimated due to overall noise in the series. Therefore, the evidence from Figure **??** shows that self-employment earnings respond much more than wage earnings, a finding in line with the previous literature.

[28] Appendix Figure A14 zooms in on married women whose labor supply decisions are traditionally expected to be most elastic. The bottom panel of the figure displays the average earnings of married women (including zeros) by year and groups of cantons from 1990 to 2010. The figure has excellent parallel trends for the three series so that we can be quite confident that earnings of married women, which include both the intensive and extensive margins, did not respond.

In Figure 9, we repeat Figure **??** but zooming in on high income earners. This figure displays average wage earnings (top) and average self-employment earnings (bottom) by year and groups of cantons from 1990 to 2010. We start from the sample from Figure **??** with the additional restriction that the individual has average annual labor earnings (wages plus self-employment) above 200,000 CHF in 1994-1996, a couple years before the reform started. Earnings are expressed in 1000s of 2010 CHF (adjusted for inflation). The top panel on wage earnings shows a clear and significantly larger response of wage earnings for this high-income group (relative to the full population), of around 5% excess earnings during the tax holidays. The bottom panel also shows large spike in self-employment income for the 2001-2 tax holiday, again of about 7-10% excess income in these years.

Columns (2-4) in Table 3 present the quantitative estimates of the earnings effects based on the graphical analysis we have presented. Column (2) focuses on earnings per person (including non workers). Column (3) considers wage earnings per employee and column (4) considers self-employment earnings per self-employed worker. Table **??** reports labor supply effects of the tax holiday for the same outcomes as in Table 3 by 5 income sub-groups where individuals are assigned to one of the five income groups based on the average income in the three years 1994–1996, i.e. shortly before the first wave of tax holidays. Workers aged 20–60 that have no labor income in these years are dropped from the analysis.[29] As noted above, the estimates of the Frisch elasticity η^F reported in the tables are based on changes in marginal tax rates. For the full sample, the percent increase in one minus the marginal tax rate amounts to $\Delta(1-\tau) = 27.6\%$.

Panel A of column (2) in Table 3 shows that earnings per person respond significantly to the tax holiday, with a 1.4% effect relative to pre-holiday earnings. Given the estimated decrease in the marginal tax rate, this estimate translates into a small but precisely estimated Frisch elasticity of .05 (0.017). The effect is concentrated solely among men ($\eta^F = .06$), with no statistically significant effects among women ($\eta^F = .02$) in contrast to the usual finding from the literature that female labor supply is more elastic than male labor supply.

Column (2) of Table **??** shows that earnings responses are more significant among higher earnings groups. Among the highest earnings group, with annual earnings above 200,000 CHF, the earnings effect is 5.3%, implying a Frisch elasticity of $\eta^F = .09$. Columns (3) of Tables 3 and **??** show that wage earnings per worker respond to the tax holiday but less than total earnings. The response of wage earnings is significant for men but not for women. The response of wage earnings is insignificant for low and middle wage earners but becomes significant for top wage earners. Individuals with wage

[29] This table also shows employment rate effects in column (1). We do not find any significant effects along the extensive margin for any income group consistent with our earlier analysis.

earnings above 200,000 CHF show a substantial response of 5.1% with an implied Frisch elasticity of .09. Column (4) shows that self-employment earnings respond strongly to the tax holiday with an overall Frisch elasticity of .27 (.09) in the full sample. We find that the response is stronger for men than for women. As shown in Table **??**, the response of self-employment earnings is strong along the full distribution of labor income. The Frisch elasticities implied by these estimates are significantly higher than those for wage earnings. Because the tax burdens are smaller for low-income individuals, the Frisch elasticities decline with income, ranging from .44 for self-employed in the lowest income groups to .12 for self-employed in the highest income group.

Appendix Table A3 explores whether the positive effects on earnings during the tax holiday come at the expense of earnings just before and just after the tax holiday. Consistent with our graphical analysis, estimates do not generate statistically significant evidence of depressed earnings around the tax holidays. This suggests that the extra earnings during the tax holiday do not come solely at the expense of earnings in surrounding through short-term retiming.

5.4 Additional Results

Decomposing earnings: hours of work and wage rates. In the basic model of labor supply and demand that we described above, the tax holiday creates a positive labor supply response in the form of increased hours of work. This positive labor supply effect might in turn reduce the wage rate if labor demand is not perfectly elastic. This will dampen the effect on total earnings. Therefore, it is important to examine separately the effects on hours of work and wage rates. Hours of work and wage rates are not measured in the social security data but are measured in the labor force survey and the wage structure survey. We present evidence from the wage structure surveys.[30]

Figure 15 depicts hours of work (top panel) and hourly wage rates (bottom panel) by year and group of cantons using the wage structure surveys 1994–2010 carried out bi-annually.[31] Hours of work and hourly wages are based on the month of October in each year. Hours worked refer to contractual (i.e. normal) hours worked for workers with monthly wages and to actual hours worked for workers paid by the hour. Wage rates incorporate regular pay but exclude overtime and variable pay components (e.g. bonuses). In both panels, the sample in each year is limited to workers aged 20–60, excluding public sector employees and foreign workers that do not pay regular taxes in

[30] The labor force survey is much smaller and hence produces noisier series. These series are presented in appendix Figure A13 and show results consistent with the larger wage structure survey but noisier.

[31] We show in appendix Figure A15 that total monthly earnings in the wage structure survey respond to the tax holiday consistent with our findings from the social security data.

Switzerland. We group cantons as usual by when they experienced their tax holiday. Geographical information in the wage structure survey is based on place of work while tax treatment is based on residence. To reduce the number of cases where a person works in one group of cantons but resides in another one, we exclude zip codes in which more than 25% of workers live and work in different groups of cantons according to the census in 2000 (see section 4).

Both panels display fairly stable parallel trends before and after the reform. The top panel shows at best a very small response of hours of work to the tax holiday. Appendix Figure A16 shows that the hours response is concentrated among employees with individual contracts with no response for employees under a collective (firm-, occupation-, or industry-wide) bargaining agreement. This could be explained by the fact that employees on individual contracts have more flexibility to choose their hours of work and because, under collective agreement, overtime wages tend to carry a higher premium, so that employers might be more reluctant to use overtime.

The bottom panel is consistent with a *positive* effect of the tax holiday on wage rates. There is a spike in hourly wage rates at the time of the tax holiday, both for the cantons transitioning in 1999-2000 and even more so for the cantons transitioning late in 2001-2002. This positive effect is the reverse of a labor demand effect driving wages down during the tax holiday. It suggests instead that workers are able to manipulate their wage rate as well to drive up their earnings and take advantage of the tax holiday.[32]

Overall, the decomposition of earnings into wages and hours of work shows clearly that the labor demand channel cannot explain the very small effects on earnings we have obtained. In contrast to the labor demand channel story, we have found that wage rates respond if anything positively to the tax holiday. Therefore, the change in net-of-tax wage rates due to the tax holiday is not dampened through a labor demand reduction in wage rates. The lack of effects on hours of work we have found confirms that the Frisch labor supply elasticity is very small.

Finally, we look at bonuses, which is an earnings component that is more flexible than regular wages and salaries and hence might be used to shift earnings toward the tax holiday years. Bonus data are available in the wage structure survey (but not the social security earnings). Figure 16 displays the fraction of employees with bonuses above 5,000 CHF (among all employees including those with no bonus) by year and groups of cantons from 1996 to 2010 using the wage structure survey (LSE) carried out bi-annually. The sample in a given year t includes all employees in the dataset weighted to

[32]To test this hypothesis, we show in appendix Figure A17 that the hourly wage response is stronger when the sample is restricted to workers more likely to be well informed about the tax holiday (workers in activities "examining, advising, attesting".

represent population averages. The top panel is for all employees while the bottom panel is restricted to male workers in private sector firms. The top panel shows clear evidence of a bonus spike during the tax holidays, especially in the cantons that transitioned late in 2001-02. Bonus likelihood was around 8% and jumps up to 10% during the tax holiday before falling back some after the tax holiday. The bottom panel shows that the bonus spike is more pronounced within the sample of male employees in the private sector. Therefore, this evidence confirms that workers are able to shift bonuses to take advantage of the tax holiday. The absence of hours of work effects along with positive effects on wage rates and bonuses suggests that the response we have obtained might be due to tax avoidance rather than actual labor supply behavior.

The estimates corresponding to the graphical evidence shown in previous figures using the Wage Structure Survey are presented in Table 7. The table presents estimates of the tax holiday on labor supply and wages based on regressions of aggregate time series for two groups of cantons (cantons which transitioned in 2001 and 3 cantons which transitioned in 2003) on year dummies, group dummies, and an indicator which is 1 in the year in which municipal and cantonal taxes are zero. The dependent variable in column (1) is earnings in 2010 CHF in October of each year. Earnings include regular salaries and overtime and other variable pay components (e.g. bonuses). The dependent variable in column (2) is hourly wages, computed from October salaries in each year, excluding overtime and variable pay components (e.g. bonuses). The dependent variable in column (3) is employer-reported hours worked per worker in October. The dependent variable in column (4) is the fraction of employees with bonuses above 5,000 in 2010 CHF. Panel A reports results for all employees aged 20–60 (excluding public sector employees). Panel B is restricted to workers with individual wage contracts. Panel C is restricted to workers falling under a collective (firm-, occupation-, or industry-wide) bargaining agreement. Panel D is restricted to workers in jobs with the main activities examining, advising, and attesting.

The results from the table confirm our graphical evidence. There is a significant effect of 1.5% on total earnings for the total sample—an estimate that is in line with our baseline estimate in Table **??** based on the social security data. The effect on earnings is much stronger (4.5%) in the job category examining/advising/attesting. This effect on total earnings is driven by an effect on hourly wage rates of 1.2% (also much stronger for the examining/advising/attesting sector). The effect on hours of work is very small (0.3%) and insignificant. The effect on hours of work is stronger (0.8%) and significant for workers in individual contracts. The estimated effect on bonuses is fairly large (around 10%) but not quite significant due to the noise in the series.

Response to local tax levels. Next, we examine heterogeneity in tax holiday effects by the size of local taxes, exploiting the rich variation in tax rates that is illustrated in appendix Figure A1. We focus on high earners and the self-employed as these two groups displayed the largest responses and because tax rate variation across municipalities is largest for high-income earners. This combination gives us the best shot at detecting heterogeneous effects based on the size of the tax change.

Figure 17 displays average wage earnings (top) and average self-employment earnings (bottom) by year and groups of cantons from 1995 to 2005. The sample in a given year t is all individuals aged 20-60 in year t who are still alive and Swiss residents by 2010 (i.e., present in the 2010 Census) and had average annual labor earnings (wages plus self-employment) above 200,000 CHF in 1994-1996. Earnings are expressed in 1000s of 2010 CHF (adjusted for inflation). We consider two groups of cantons: (a) 4 cantons which transitioned in 2001 with a tax holiday for 2000 only for local income taxes and 1999-00 for the federal tax (in darker green), (b) 3 cantons which transitioned in 2003 with tax holiday in 2001-02 (in brown). Group (b) is further split into three subgroups of municipalities based on the level of taxes in each area: (1) low marginal tax rates in 2000 (squares, solid line), (2) medium marginal taxes (triangles, dotted line), and (3) high marginal taxes (circles, dashed line). In the series, the dots corresponding to tax holidays are bigger and are blanked out. For each of the two groups, we represent the corresponding tax holiday periods using the vertical shading and the same color code.

Appendix Figure A18 displays the first stage. It shows that average marginal tax rates were about 6 points higher in the high tax municipalities (around 41%) than in the low tax municipalities (around 35%) just before the tax holidays. The rates are high because we focus on high income earners. This implies that the high tax group experienced a net of tax rate increase of 69.5% during the tax holiday while the low tax group experienced a net of tax rate increase of 54%. Hence, we should expect a behavioral response 29% larger in the high tax group if responses are proportional of the change in net-of-tax rates.

The top panel of Figure 17 shows that the effects on high wage earners are similar across the three groups of localities ranked by tax rates. The figure also reflects the well-documented sorting of high-earners into low-tax municipalities: those with the highest incomes live in the low-tax areas. They are likely to be of the optimizing type and hence have a large elasticity. This may explain why they do not react less than those living in high-tax areas. The latter do react more than those living in medium-tax areas, where average incomes of the high-income earners are almost identical pre- and post-reform.

In contrast, the bottom panel shows that the spike in self-employment earnings is larger in the localities with the highest tax rates during the first blank year. For self-

employed, income sorting seems to be more difficult. Low-tax municipalities within a canton tend to be in suburban or rural areas. Self-employed business owners are more likely to be tied to the location where they have their business and their customers. This explains why those with the highest incomes nevertheless live in high-tax areas. Overall, there is only weak evidence that the size of the response is related to the size of the tax rate cut. Income sorting may conflate responses along this line. The fact that the response of the self-employed is substantially larger than the response of employees again is suggestive evidence that the response is more likely due to tax avoidance rather than real labor supply.

Heterogeneity. We explore in appendix Table A4 whether the tax holiday effects we have uncovered are heterogeneous along various dimensions. We investigate information proxies (whether the canton held a popular referendum on the tax reform and whether this vote happened early or late), tax burden proxies (whether local average or marginal average tax rates are high), cultural proxies (French- vs. German-speaking municipalities), as well as the level of the unemployment rate. We do not find any robust evidence of heterogeneous effects along these dimensions. This suggests that none of these factors were critical in driving the responses we have found. Consistent with Figure 17, places with higher marginal tax rates seem to display larger responses but the effect is at best marginally significant.

5.5 Robustness Checks

Controlling for canton, age, and individual fixed effects. Appendix Table **??** shows that our baseline estimates of the labor supply effects of the tax holiday from Table 3 are robust if we flexibly control for canton, age, and person fixed effects. With person fixed effects, the effect of the tax holiday is purely identified from within-person variation in labor supply in these regressions. Age fixed effects control for the lifecycle labor supply profile of men and women. To parallel our previous analysis without fixed effects, we adopt the following regression strategy. We first run panel regressions at the individual level for employment, total labor earnings, wages, and self-employment earnings, separately by gender.[33] More specifically, for each outcome y_{it} of individual i in year t, we estimate the following panel fixed effects regression:

$$y_{it} = \gamma_i + \gamma_{canton} + \gamma_{age} + \epsilon_{it}, \tag{1}$$

[33]Moreover, we restrict the sample to individuals with positive earnings when we focus on wage and earnings of self-employed.

where γ_i are individual fixed effects, γ_{age} are fixed effects for each year of age, and γ_{canton} are canton fixed effects. We then build aggregate time series for employment and earnings by averaging the residuals from these regressions. Reassuringly, the estimates using these residualized outcomes are both qualitatively and quantitatively close to our baseline estimates.

Sampling and estimation choices. Table **??** illustrates the robustness of our results regarding certain sampling and estimation choices. We present effects on the employment rate, average earnings per person (including non-workers), average wages per employed person, and average self-employment earnings per self-employed person for men aged 20-60 in columns (1)–(4). In column (5), we present effects on the female employment rate. Column (6) presents effects on average earnings per person for high earners (individuals with more than 200K CHF of annual earnings in 1994-1996). Panel A presents our baseline estimates for comparison.

In Panel B, we identify the effect of the tax holiday only from the response in the second cantonal blank year (if a canton has a two-year long cantonal tax holiday). The motivation to do so is the potentially greater salience of the tax holiday in the second year. The estimated effects are indeed somewhat larger by about 10-20%. We still find no evidence for an effect on the extensive margin.

Panel C and D show that our results are very similar if we only use observations with known place of residence (i.e. if we discard observations for which we had to impute the place of residence) and if we focus on Swiss nationals only, discarding foreigners.

The results are also very similar if we use wage and self-employment incomes that are not capped at 2.5 million in 2010 CHF (Panel E), or if we include the year 1998, which we dropped from the rest of the analysis and the graphs so far (Panel F). We correct for the non-random missing records in 1998 by discarding individuals that are likely to be affected by the missing data problem in 1998. To this end, we identify OASI compensation offices whose number of records is 5% lower in 1998 compared to 1997 *and* 1999. All individuals with records from these compensation offices are then dropped from the entire analysis.

Panel G uses the dataset from Panel F and includes a fourth time series for the cantons of Zurich (ZH) and Thurgau (TG) with cantonal tax holidays in 1998. The estimated Frisch elasticity for earnings tends to become somewhat smaller if we do this, but remains statistically significant and positive.

Panel H is restricted to individuals with positive labor income in previous year. We find that results are similar to the baseline results in this case as well.

6 Conclusion

Our paper has estimated the intertemporal labor supply (Frisch) elasticity of substitution exploiting an unusual tax policy change in Switzerland. In the late 1990s, Switzerland switched from an income tax system where current taxes were based on the previous two years of income to a standard annual pay as you earn system. This transition created a two-year long, salient, and well-advertised tax holiday. This change occurred both for the federal and local income taxes. Swiss cantons switched to the new regime at different points in time during the 1997–2003 period with large heterogeneity in local tax levels across places. Exploiting such rich local variation, and using population-wide administrative social security earnings data matched with census data, we identify the Frisch elasticity.

Overall, we can draw the following conclusions. First, there is no evidence at all of responses along the extensive margin, even for sub-groups likely to be more elastic such as married women. Second, there is a small aggregate response of wage earnings which is concentrated at the top of the earnings distribution for individuals with earnings above 100,000 CHK (top 5%) and no statistically significant responses for wage earnings below. The overall Frisch elasticity for wage earners is .05 and is about .1 for high wage earners. Third, there is a larger response of self-employment earnings that is present at all earnings level (and not just the top) with a Frisch elasticity around .3. Fourth, effects are concentrated among men with essentially no effects for women and even married women, in contrast to the standard findings in the labor supply literature. Fifth, most of these responses are visible for the last wave of transitioning cantons with tax holidays in 2001-2002. Responses for earlier transitions such as 1997-1998 or 1999-2000 appear to be much muted. This latter effect might be due to learning as it might take time for the public to understand tax holidays and how to respond to them.

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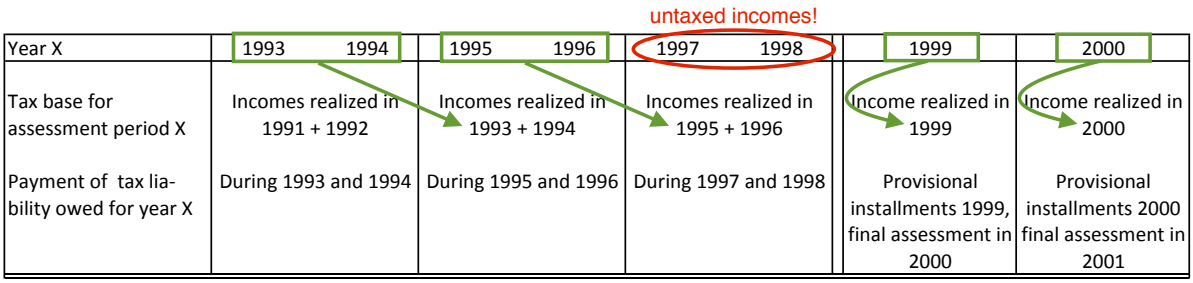


Figure 1: Transition from Old to New System

Notes: This figure depicts an example of a transition from the old system of biennial retrospective taxation to the new system of annual pay as you earn taxation in 1999. Under the old system, in 1997 and 1998, taxes are based on the average income across years 1995 and 1996. In 1999, taxes are due on current 1999 incomes. Hence, because of the transition, incomes earned in 1997 and 1998 are never taxed, creating a two-year tax holiday. The timing in the adoption of the new system varied across cantons.

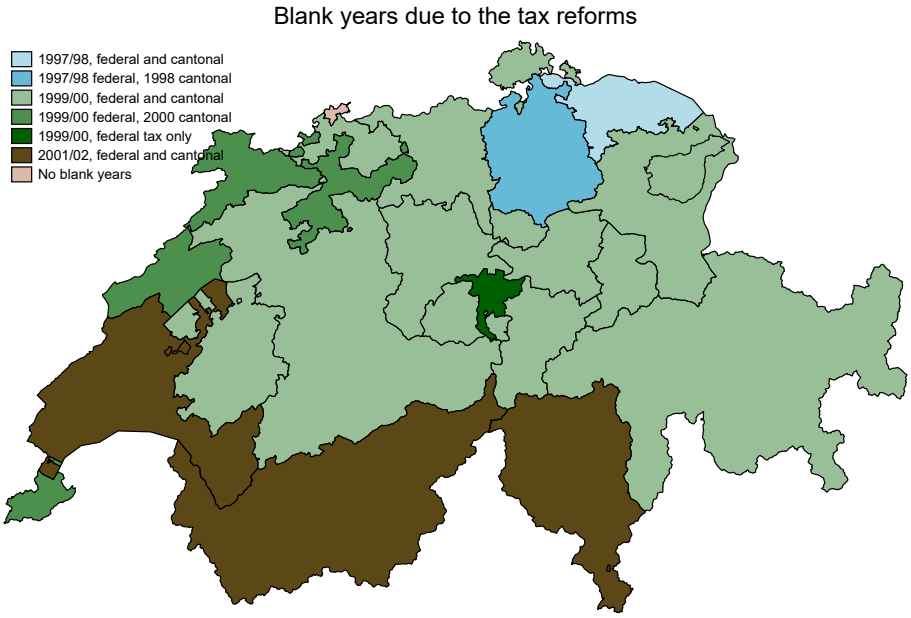
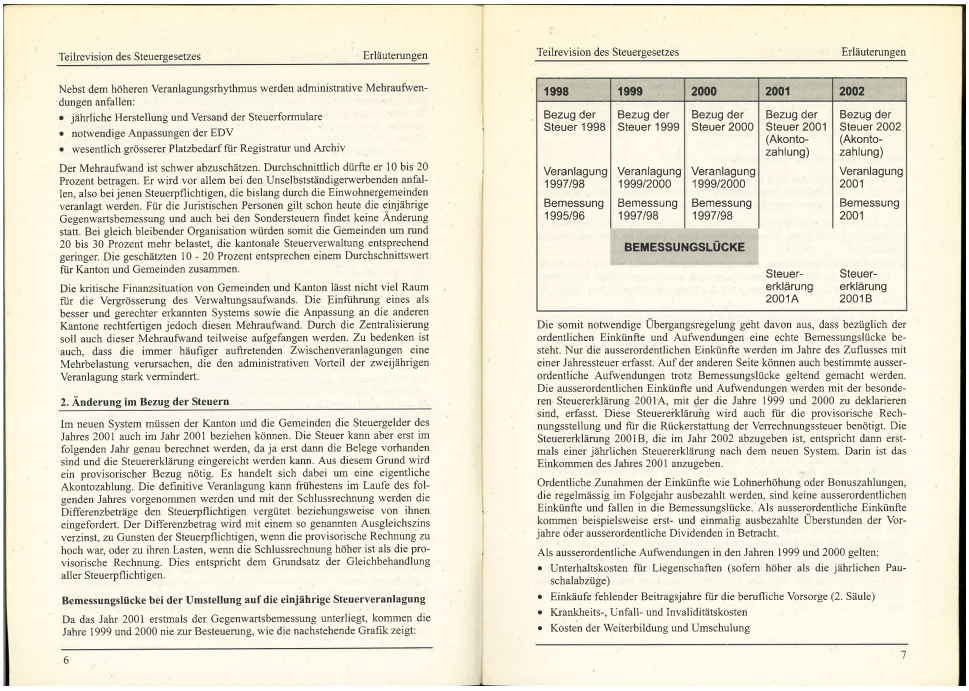


Figure 2: Tax Transition Across Swiss Cantons

Notes: This figure depicts the timing of the transition across the 26 Swiss cantons. For the federal income tax, the tax holiday was either 1997/98 (cantons in blue), 1999/00 (cantons in green), or 2001/02 (cantons in brown). Generally, the tax holiday for the local (cantonal and municipal) income tax was the same as for the federal tax. However, for cantons that were using annual assessment periods (instead of biennial), the tax holiday for local taxes is only one year. These cantons are depicted in darker blue and darker green. One canton (Nidwalden in very dark green) had no local tax holiday at all because it chose a different transition tax. One canton (Basel in pink) transitioned earlier and hence had no tax holiday.



Teilrevision des Steuergesetzes Erläuterungen

Nebst dem höheren Veranlagungsrhythmus werden administrative Mehraufwendungen anfallen:

- jährliche Herstellung und Versand der Steuerformulare
- notwendige Anpassungen der EDV
- wesentlich grösserer Platzbedarf für Registratur und Archiv

Der Mehraufwand ist schwer abzuschätzen. Durchschnittlich dürfte er 10 bis 20 Prozent betragen. Er wird vor allem bei den Unselbstständigerwerbenden anfallen, also bei jenen Steuerpflichtigen, die bislang durch die Einwohnergemeinden veranlagt werden. Für die Juristischen Personen gilt schon heute die einjährige Gegenwartsbemessung und auch bei den Sondersteuern findet keine Änderung statt. Bei gleich bleibender Organisation würden somit die Gemeinden um rund 20 bis 30 Prozent mehr belastet, die kantonale Steuerverwaltung entsprechend geringer. Die geschätzten 10 - 20 Prozent entsprechen einem Durchschnittswert für Kanton und Gemeinden zusammen.

Die kritische Finanzsituation von Gemeinden und Kanton lässt nicht viel Raum für die Vergrösserung des Verwaltungsaufwands. Die Einführung eines als besser und gerechter erkannten Systems sowie die Anpassung an die anderen Kantone rechtfertigen jedoch diesen Mehraufwand. Durch die Zentralisierung soll auch dieser Mehraufwand teilweise aufgefangen werden. Zu bedenken ist auch, dass die immer häufiger auftretenden Zwischenveranlagungen eine Mehrbelastung verursachen, die den administrativen Vorteil der zweijährigen Veranlagung stark vermindert.

2. Änderung im Bezug der Steuern

Im neuen System müssen der Kanton und die Gemeinden die Steuergelder des Jahres 2001 auch im Jahr 2001 beziehen können. Die Steuer kann aber erst im folgenden Jahr genau berechnet werden, da ja erst dann die Belege vorhanden sind und die Steuererklärung eingereicht werden kann. Aus diesem Grund wird ein provisorischer Bezug nötig. Es handelt sich dabei um eine eigentliche Akontozahlung. Die definitive Veranlagung kann frühestens im Laufe des folgenden Jahres vorgenommen werden und mit der Schlussrechnung werden die Differenzbeträge den Steuerpflichtigen vergütet beziehungsweise von ihnen eingefordert. Der Differenzbetrag wird mit einem so genannten Ausgleichszins verzinst, zu Gunsten der Steuerpflichtigen, wenn die provisorische Rechnung zu hoch war, oder zu ihren Lasten, wenn die Schlussrechnung höher ist als die provisorische Rechnung. Dies entspricht dem Grundsatz der Gleichbehandlung aller Steuerpflichtigen.

Bemessungslücke bei der Umstellung auf die einjährige Steuerveranlagung

Da das Jahr 2001 erstmals der Gegenwartsbemessung unterliegt, kommen die Jahre 1999 und 2000 nie zur Besteuerung, wie die nachstehende Grafik zeigt:

6

Teilrevision des Steuergesetzes Erläuterungen

1998	1999	2000	2001	2002
Bezug der Steuer 1998	Bezug der Steuer 1999	Bezug der Steuer 2000	Bezug der Steuer 2001 (Akonto-zahlung)	Bezug der Steuer 2002 (Akonto-zahlung)
Veranlagung 1997/98	Veranlagung 1999/2000	Veranlagung 1999/2000		Veranlagung 2001
Bemessung 1995/96	Bemessung 1997/98	Bemessung 1997/98		Bemessung 2001
	BEMESSUNGSLÜCKE			
			Steuer-erklärung 2001A	Steuer-erklärung 2001B

Die somit notwendige Übergangsregelung geht davon aus, dass bezüglich der ordentlichen Einkünfte und Aufwendungen eine echte Bemessungslücke besteht. Nur die ausserordentlichen Einkünfte werden im Jahre des Zuflusses mit einer Jahressteuer erfasst. Auf der anderen Seite können auch bestimmte ausserordentliche Aufwendungen trotz Bemessungslücke geltend gemacht werden. Die ausserordentlichen Einkünfte und Aufwendungen werden mit der besonderen Steuererklärung 2001A, mit der die Jahre 1999 und 2000 zu deklarieren sind, erfasst. Diese Steuererklärung wird auch für die provisorische Rechnungsstellung und für die Rückerstattung der Verrechnungssteuer benötigt. Die Steuererklärung 2001B, die im Jahr 2002 abzugeben ist, entspricht dann erstmals einer jährlichen Steuererklärung nach dem neuen System. Darin ist das Einkommen des Jahres 2001 anzugeben.

Ordentliche Zunahmen der Einkünfte wie Lohnerhöhung oder Bonuszahlungen, die regelmässig im Folgejahr ausbezahlt werden, sind keine ausserordentlichen Einkünfte und fallen in die Bemessungslücke. Als ausserordentliche Einkünfte kommen beispielsweise erst- und einmalig ausbezahlte Überstunden der Vorjahre oder ausserordentliche Dividenden in Betracht.

Als ausserordentliche Aufwendungen in den Jahren 1999 und 2000 gelten:

- Unterhaltskosten für Liegenschaften (sofern höher als die jährlichen Pauschalabzüge)
- Einkäufe fehlender Beitragsjahre für die berufliche Vorsorge (2. Säule)
- Krankheits-, Unfall- und Invaliditätskosten
- Kosten der Weiterbildung und Umschulung

7

Figure 3: Explanation of the Blank Years for the Voters

Notes: The figure depicts the voting pamphlet explaining the incidence of blank years ("Bemessungslücke") sent to voters before the tax reform referendum for the canton of Obwalden. Such voting documents were typically produced in cantons organizing a referendum for the tax transition.

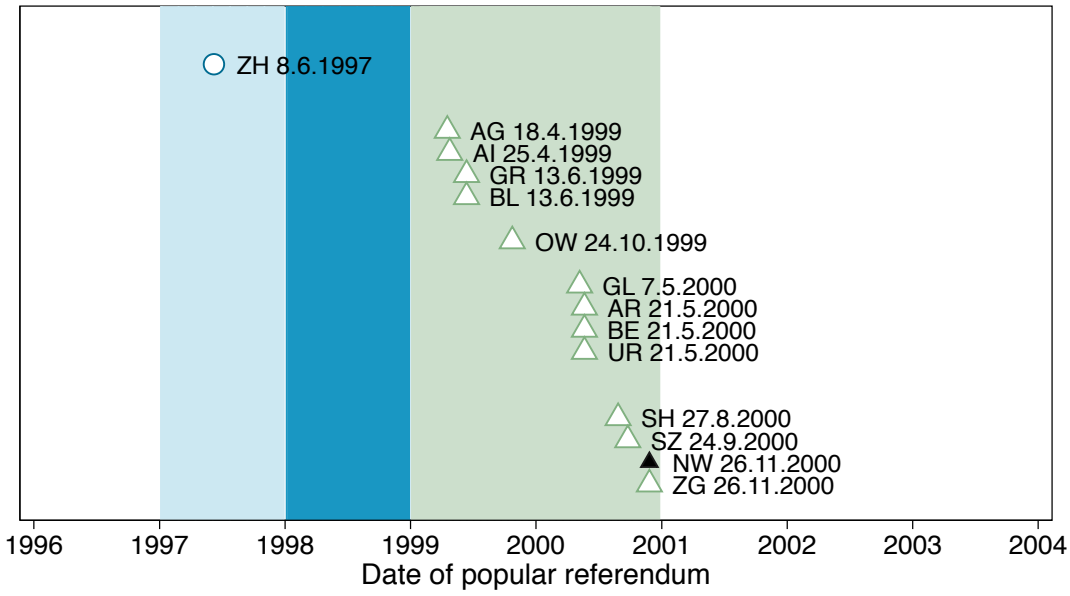


Figure 4: Dates of Cantonal Referenda

Notes: The figure depicts the dates of cantonal referenda held in each canton where the new law was put to a public vote. The colored time frames indicate periods of the federal and cantonal tax holidays applying to the cantons where a vote was held. Note that NW only had a federal holiday. The voting referendum was the very last part of the reform process.

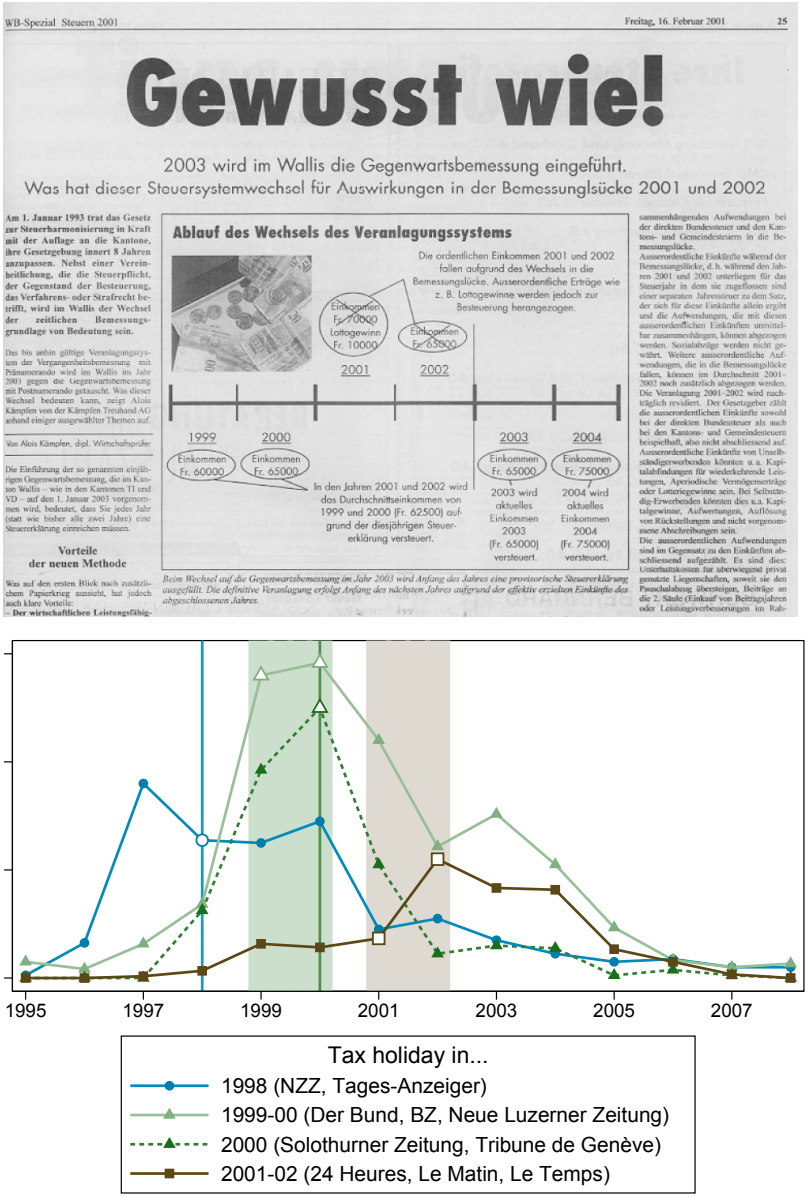


Figure 5: Press Articles Referring to the Tax Holiday

Notes: The top panel shows an illustration of a press article explaining the tax reform and the tax holiday it creates. The article was published on February 16, 2001 for the canton of Valais, which transitioned in 2003 and hence had a tax holiday for years 2001 and 2002. Hence, as early as the beginning the first holiday year, the public was clearly informed that incomes earned in 2001 and 2002 would not be taxed. The bottom panel shows the number of press articles mentioning the word "Bemessungslücke" (blank year) and the French term "brèche fiscale", or other expressions used to refer to the reform in German and French (Gegenwartsbesteuerung, Gegenwartsbemessung, postnumerando, pränumerando, brèche de calcul, trou de taxation, taxation bianuelle, taxation annuelle) by year and most major newspapers. The figure displays four series: (1) the series in blue is for two Zurich based newspapers, (2) the series in light green for three Bern and Lucerne based newspapers, (3) the dashed series in dark green for two Geneva and a Solothurn based newspapers, (4) and the series in brown for three Vaud and Valais based newspapers. In the series, the dots corresponding to tax holidays are bigger and are blanked out (as tax holidays are called blank years in French and German). The tax holiday periods are also depicted in shaded colors. The figure shows that local press interest in the tax holiday typically peaked during the years when the actual tax holidays happened locally.

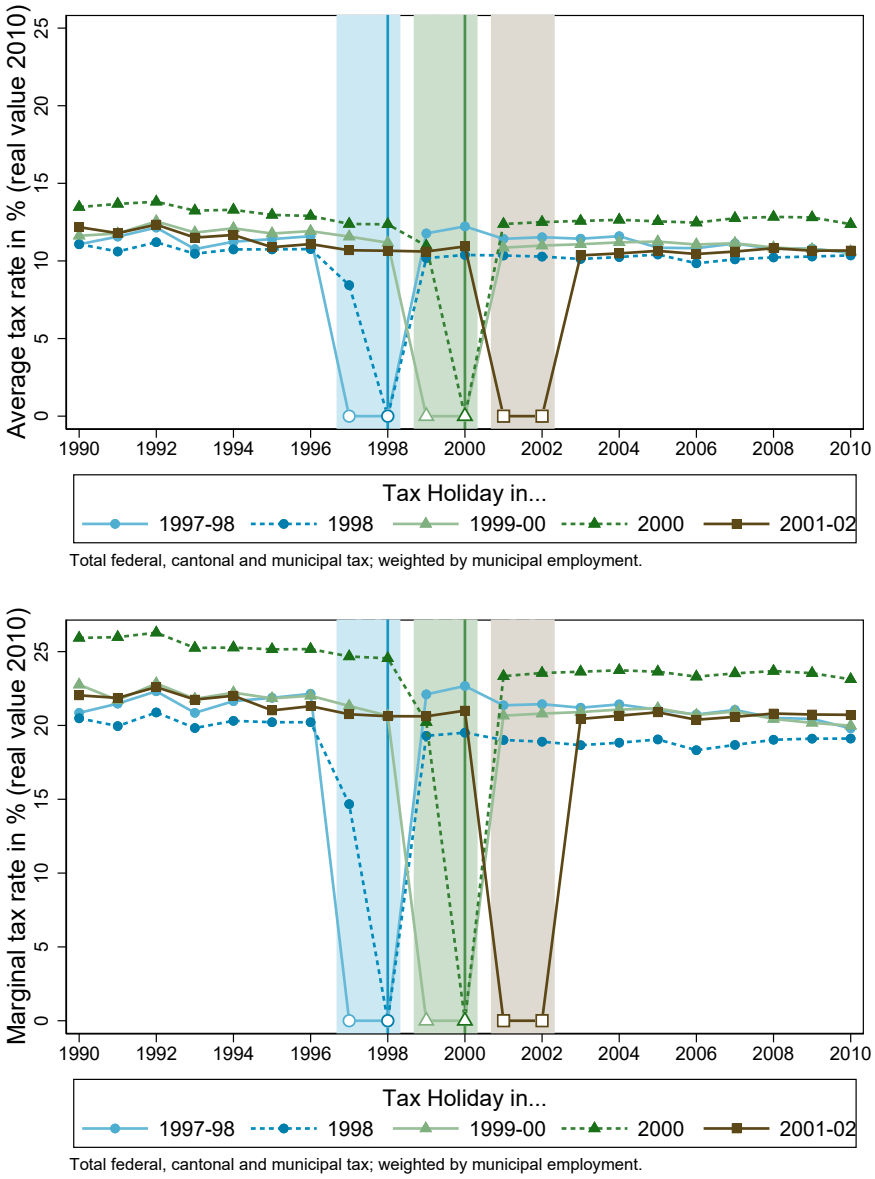


Figure 6: Effect of Tax Reform on Average and Marginal Tax Rates

Notes: This figure displays the average income tax rate (top panel) and average marginal income tax rate (bottom panel) for employed persons in our sample by year and groups of cantons from 1990 to 2010. Tax rates include federal, cantonal, and municipal income taxes. We use tax rates based on household income for married individuals with two children in case a person is married, and tax rates for singles in case a person is single. The average tax rate is the total income tax divided by gross income. Averages across municipalities and cantons are employment weighted. The cantons are divided in five groups based on when the tax holiday took place. (1a) light blue: tax holiday in 1997-98 (1 canton), (1b) dark blue dashed: tax holiday in 1998 (1 canton), (2a) light green: tax holiday in 1999-2000 (15 cantons), (2b) dark green: tax holiday in 2000 (4 cantons), (3) brown: tax holiday in 2001-02 (3 cantons). In the series, the dots corresponding to tax holidays are bigger and are blanked out (as tax holidays are called blank years in French and German). Tax rates are naturally zero during tax holidays. Cantons with a single year tax holiday (groups 1b and 2b) also have a *federal* tax holiday the preceding year explaining the lower tax rate but it is a small effect as federal income tax revenue is only 1/6 of total income tax revenue. This graphical representation will be used in all subsequent reduced form graphs. For each of the groups, we represent the corresponding tax holiday periods using the vertical shading and the same color code.

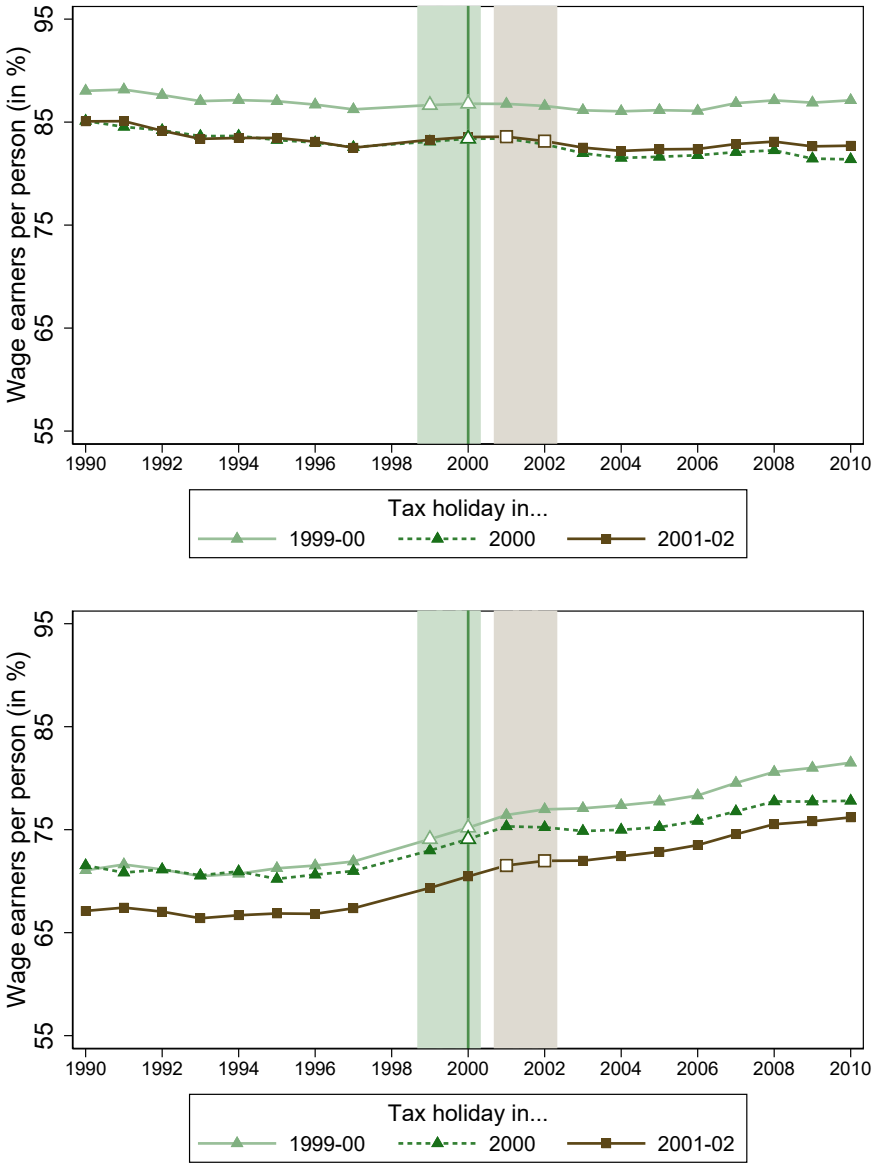


Figure 7: Effects of Tax Holiday on Employment of Wage Earners: Males (top), Females (bottom)

Notes: This figure displays the employment rate of wage earners by year and groups of cantons from 1990 to 2010. The top panel is for men and the bottom panel for women. The sample in a given year t is all individuals aged 20-60 in year t who are still alive and Swiss residents by 2010 (i.e., present in the 2010 Census). The employment rate is computed as the fraction of individuals in the sample with positive wage earnings during the year. The three groups of cantons are: (2a) 16 cantons which transitioned in 2001 with a tax holiday in 1999-00 for both the federal and local income taxes (in light green), (2b) 4 cantons which transitioned in 2001 with a tax holiday for 2000 only for local income taxes and 1999-00 for the federal tax (in darker green), (3) 3 cantons which transitioned in 2003 with tax holiday in 2001-02 (in brown). For each of the three groups, we represent the corresponding tax holiday periods using the vertical shading and the same color code. In the series, the dots corresponding to tax holidays are bigger and are blanked out (as tax holidays are called blank years in French and German). The figure shows no evidence of employment effects due to the tax holiday.

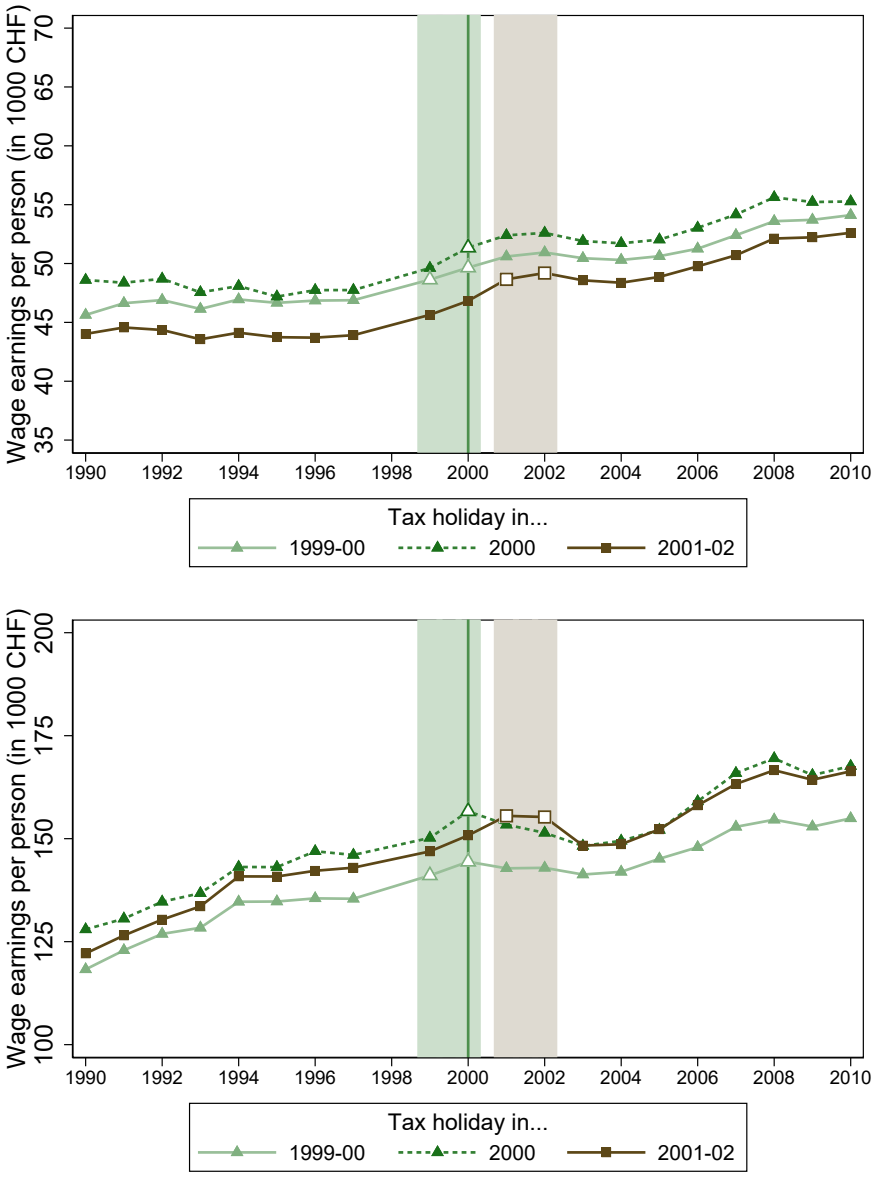


Figure 8: Effects of Tax Holiday on Wage Earnings: All (top) and High Earners (bottom)

Notes: This figure displays average wage earnings (including non-workers) by year and groups of cantons from 1990 to 2010. The top panel is for all wage earners and the bottom panel for individuals that have average annual labor earnings (wages plus self-employment) above 100,000 CHF in 1994-1996. The sample in a given year t is all individuals aged 20-60 in year t who are still alive and Swiss residents by 2010 (i.e., present in the 2010 Census). Wage earnings are expressed in 1000s of 2010 CHF (adjusted for inflation). The three groups of cantons are: (2a) 16 cantons which transitioned in 2001 with a tax holiday in 1999-00 for both the federal and local income taxes (in light green), (2b) 4 cantons which transitioned in 2001 with a tax holiday for 2000 only for local income taxes and 1999-00 for the federal tax (in darker green), (3) 3 cantons which transitioned in 2003 with tax holiday in 2001-02 (in brown). For each of the three groups, we represent the corresponding tax holiday periods using the vertical shading and the same color code. In the series, the dots corresponding to tax holidays are bigger and are blanked out (as tax holidays are called blank years in French and German).

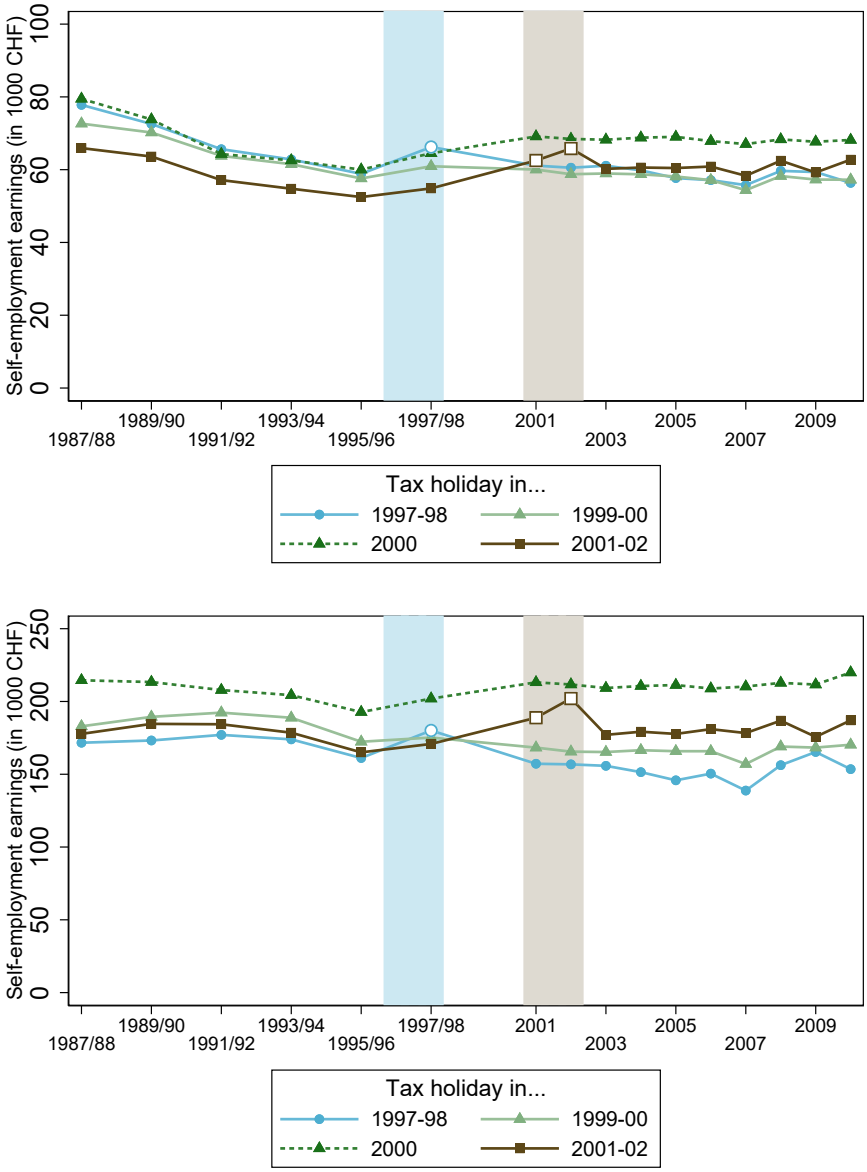


Figure 9: Effects of Tax Holiday on Self Employment Earnings: All (top) and High Earners (bottom)

Notes: This figure displays average self-employment earnings by year and groups of cantons from 1990 to 2010. The top panel is for all self-employed and the bottom panel for individuals that have average annual labor earnings (wages plus self-employment) above 100,000 CHF in 1994-1996. The sample in a given year t is all individuals aged 20-60 in year t who are still alive and Swiss residents by 2010 (i.e., present in the 2010 Census). Earnings are expressed in 1000s of 2010 CHF (adjusted for inflation). Self-employment earnings in 1999 and 2000 are subject to a social security tax holiday and hence unobserved in the data. The four groups of cantons are: (1a) 1 canton which transitioned in 1999 with tax holiday in 1997-98 for both the federal and local income taxes (in light blue), (2a) 16 cantons which transitioned in 2001 with a tax holiday in 1999-00 (in light green), (2b) 4 cantons which transitioned in 2001 with a tax holiday for 2000 (in darker green), (3) 3 cantons which transitioned in 2003 with tax holiday in 2001-02 (in brown). In the series, the dots corresponding to tax holidays are bigger and blanked out (as tax holidays are called blank years in French and German). For the two of the four groups where we have data during the corresponding tax holiday period, we represent the tax holiday using the vertical shading and the same color code.

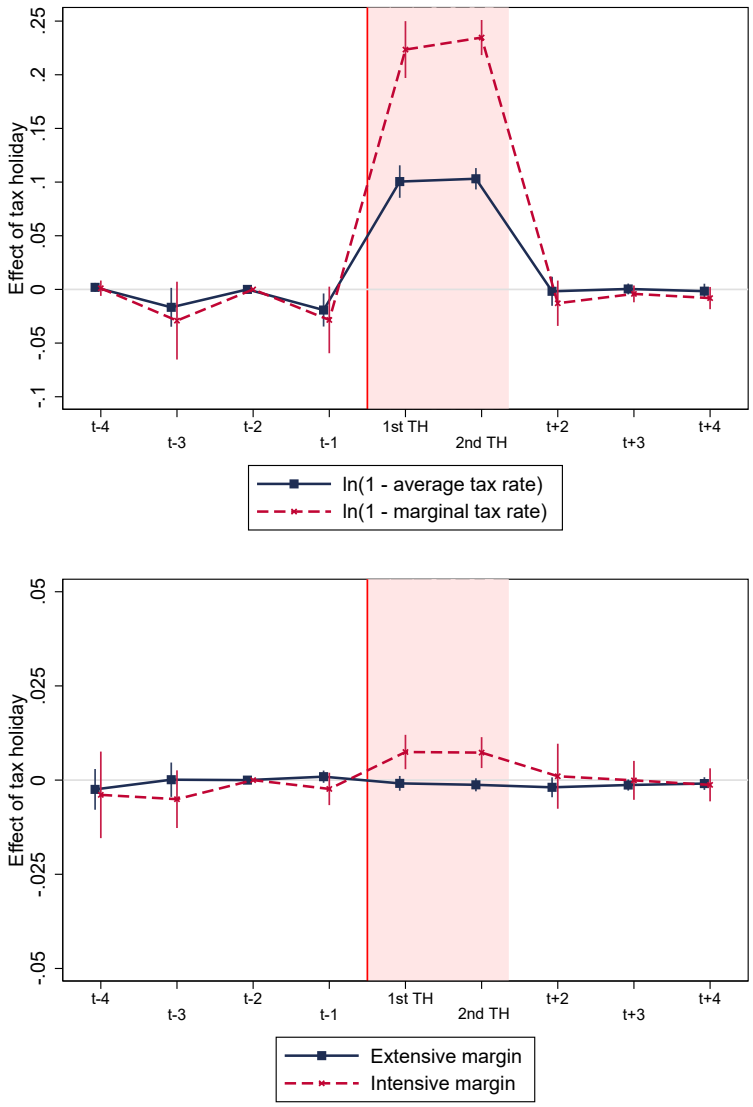


Figure 10: Event Study Estimates of the Effect of the Tax Holiday for Wage Earners

Notes: This figure shows estimates of the effects of the tax holiday (TH) on the log net-of-tax rate (the first stage, top panel) and employment and wage earnings per employee (the reduced form effect, lower panel). The figure is based on the following event study estimated at the individual level: $Y_{it} = \alpha_i + \alpha_t + \sum_{k=-4}^{4} \delta_k TH_{ct}^k + X_{it} + \epsilon_{it}$, where Y_{it} is an outcome of individual i in period t, α_i and α_t represent person and year fixed effects, respectively, and $\sum_{k=-4}^{4} \delta_k TH_{ct}^k$ is a sequence of event study dummies that are one k periods away from the first year of the federal tax holiday in canton c. The estimation sample covers the years 1995–2006 (± 4 years around the tax holiday years), excludes 1998, and comprises two groups of cantons which transitioned in 2001 and 3 cantons which transitioned in 2003. We focus on workers aged 22–55 in 1996 and drop workers older than 62 in later years. The dependent variables in the top panel are $ln(1-\tau)$, where τ represents the average and the marginal tax rate, respectively. The latter estimation is restricted to individuals with positive wage earnings in a given year. In the lower panel, the dependent variable in the model "extensive margin" is an indicator equal to 1 if a person has positive wage income in a given year. The dependent variable in the model "intensive margin" is average wages of employees (excluding non-workers) in 2010 CHF. The effect is scaled post-estimation by mean wages in the estimation sample. Individuals are assigned to cantons based on where they lived in 1996. The vector of controls X_{it} comprises age and age squared by gender and linear time trends by canton of residence. Standard errors are clustered on the level of commuting zones.

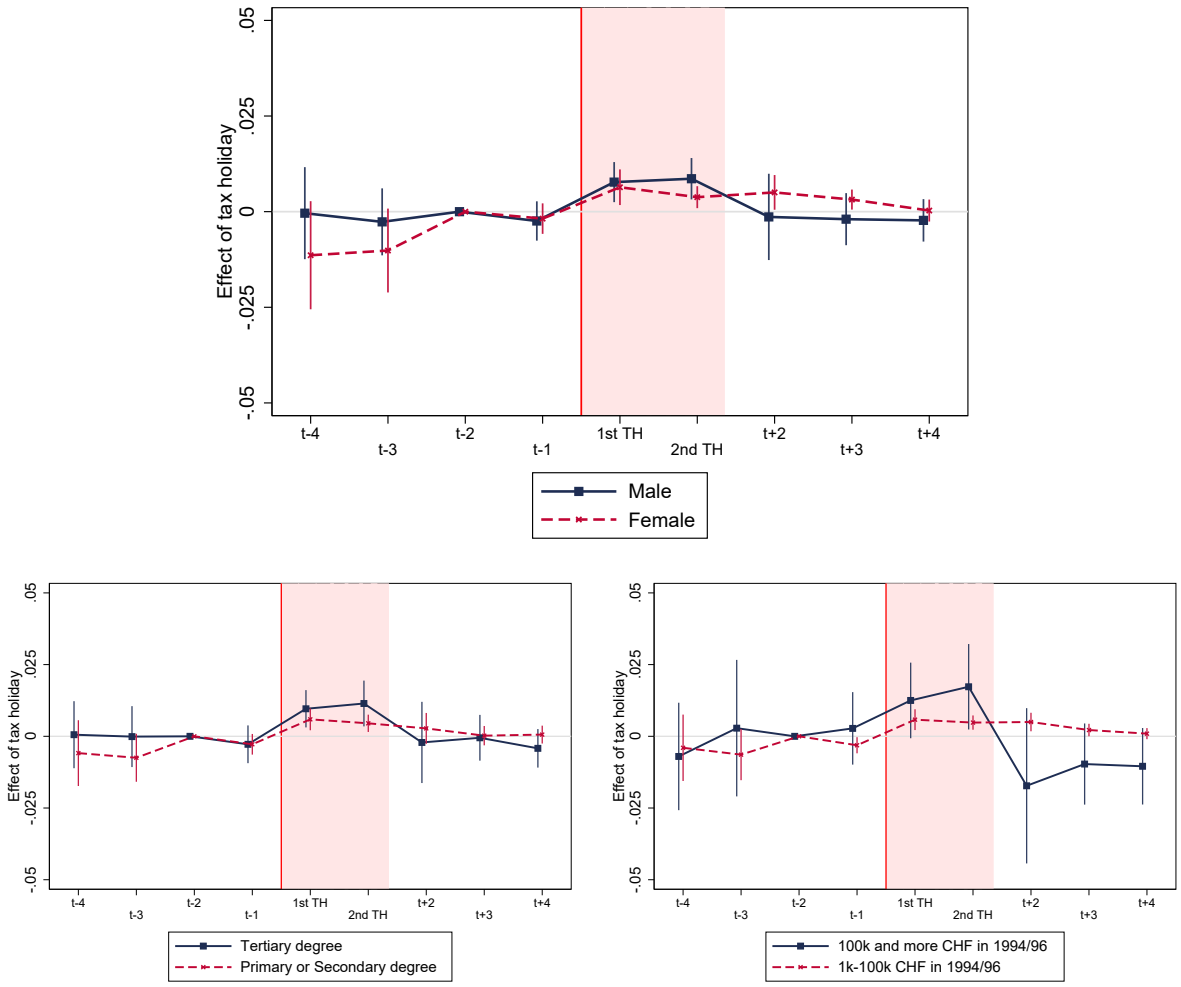


Figure 11: Heterogeneity of Wage Response to Tax Holidays at Intensive Margin

Notes: This figure shows estimates of the effects of the tax holiday (TH) on wage earnings per employee for different subpopulations. The figure is based on the following event study estimated at the individual level: $Y_{it} = \alpha_i + \alpha_t + \sum_{k=-4}^{4} \delta_k TH_{ct}^k + X_{it} + \epsilon_{it}$, where Y_{it} is an outcome of individual i in period t, α_i and α_t represent person and year fixed effects, respectively, and $\sum_{k=-4}^{4} \delta_k TH_{ct}^k$ is a sequence of event study dummies that are one k periods away from the first year of the federal tax holiday in canton c. The estimation sample covers the years 1995–2006 (± 4 years around the tax holiday years), excludes 1998, and comprises two groups of cantons which transitioned in 2001 and 3 cantons which transitioned in 2003. We focus on workers aged 22–55 in 1996 and drop workers older than 62 in later years. The dependent variable is average wages of employees (excluding non-workers) in 2010 CHF. The effect is scaled post-estimation by mean wages in the estimation sample. The top panel compares males and females. The panel at the bottom right compares workers depending on their highest educational attainment in 2000. The panel at the bottom left compares individuals depending on their average total labor income in the 1994–1996 period. Individuals are assigned to cantons based on where they lived in 1996. In each case, the vector of controls X_{it} comprises age and age squared by gender and linear time trends by canton of residence. Standard errors are clustered on the level of commuting zones.

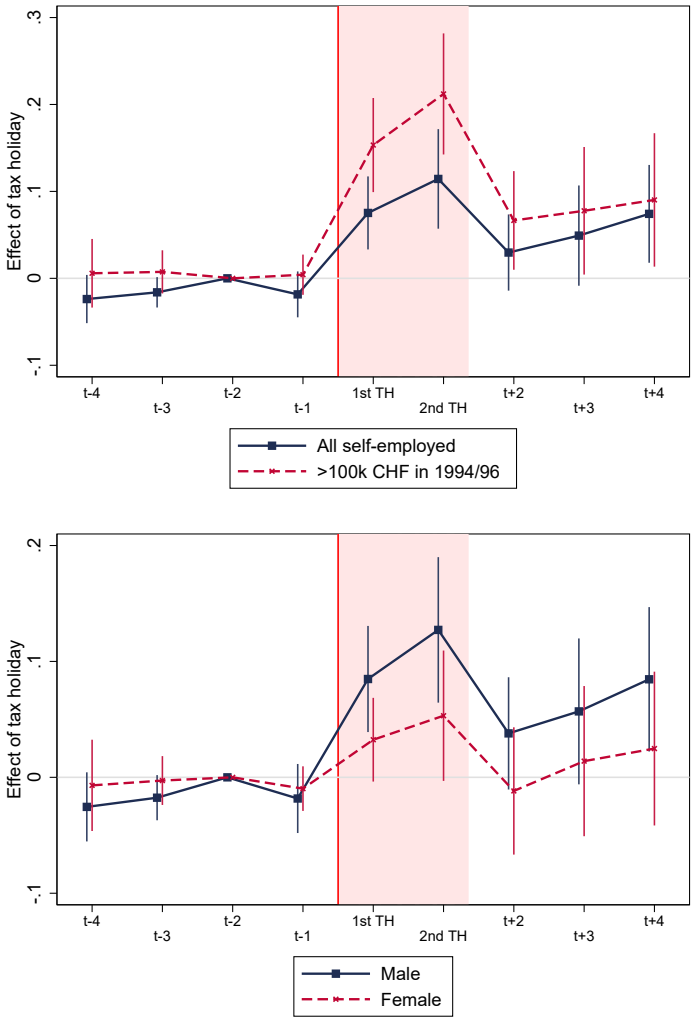


Figure 12: Event Study Estimates of the Overall Effect of the Tax Holiday on the Self-Employed: All and High Earners (top) and By Gender (bottom)

Notes: This figure shows estimates of the effects of the tax holiday (TH) on self-employment earnings per person for different subpopulations. The figure is based on the following event study estimated at the individual level: $Y_{it} = \alpha_i + \alpha_t + \sum_{k=-4}^{4} \delta_k TH_{ct}^k + X_{it} + \epsilon_{it}$, where Y_{it} is an outcome of individual i in period t, α_i and α_t represent person and year fixed effects, respectively, and $\sum_{k=-4}^{4} \delta_k TH_{ct}^k$ is a sequence of event study dummies that are one k periods away from the first year of the federal tax holiday in canton c. The estimation sample covers the years 1990–2010 (including 1998) and comprises one canton that transitioned in 1999, two groups of cantons which transitioned in 2001, and 3 cantons which transitioned in 2003. We focus on workers aged 20–55 in 1996 that are self-employed at least once in the estimation period. We exclude workers older than 62 in later years. The dependent variable is annual self-employment income per person (including 0 if there is no self-employment earnings in a given year). The effect is scaled post-estimation by mean self-employment earnings in the estimation sample. The top panel compares the effect for the total sample against individuals with an average labor income that exceeds 100k in the 1994–1996 period. The lower panel compares men and women. Individuals are assigned to cantons based on where they lived in 1996. In each case, the vector of controls X_{it} comprises age and age squared by gender and linear time trends by canton of residence. Standard errors are clustered on the level of commuting zones.

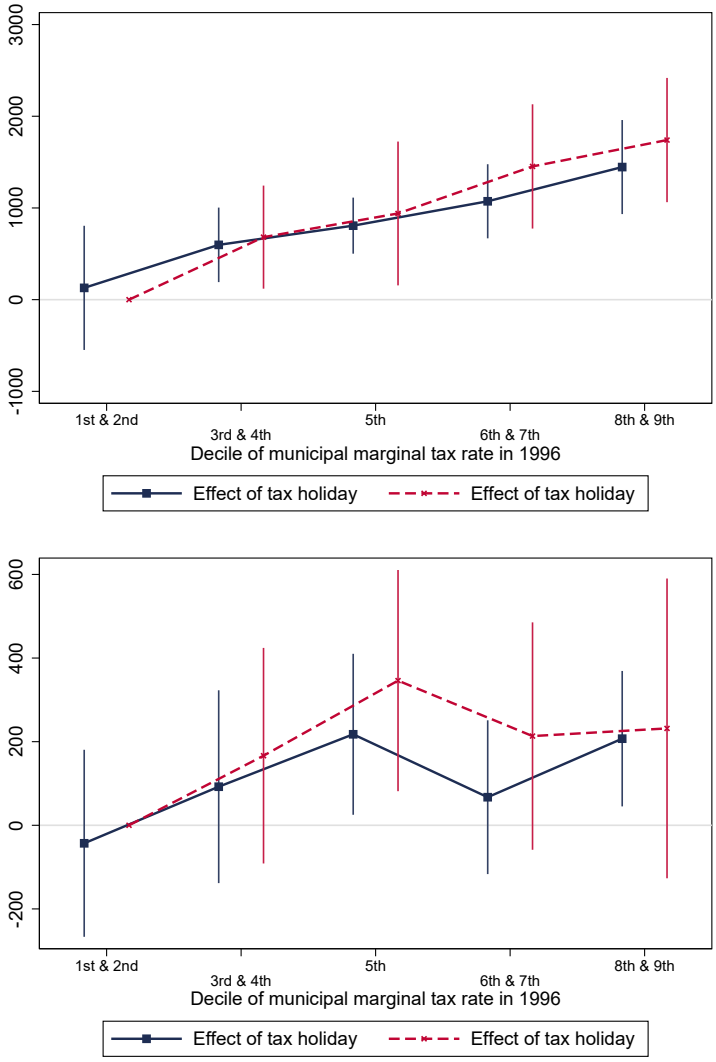


Figure 13: Effects of Tax Holiday on Wage Earnings Exploiting Cross-Sectional Variation in Tax Rates: Males (top), Females (bottom)

Notes: The figure displays estimated effects and associated 95% confidence of the blank year on wage earnings (including non-workers) by municipal tax burden for men (top) and women (bottom). To identify these effects, we exploit the large between-municipality variation in tax rates that lead to differences in the tax reduction caused by the tax holiday. The results are derived from individual-level regressions of wage incomes on person fixed effects, year fixed effects, and an indicator for the blank year interacted with five indicators equal to 1 if an individual's municipality of residence belongs to the respective group in terms of tax burden. Municipalities are assigned to these five groups based on the average marginal tax of all workers living there in 1996. For instance, the municipal marginal tax rate in 1996 was 14.7% on average in low-tax municipalities (1st and 2nd decile), while it was 24.2% in the top two deciles. The estimation sample covers the years 1990–2010 (excluding 1998) and comprises two groups of cantons which transitioned in 2001 and 3 cantons which transitioned in 2003. We focus on workers aged 20–55 in 1996 and drop workers older than 62 in later years. Controls are age and age squared and canton-specific linear time trends. In the specification termed "Canton-group period FE + interactions with tax rates", we also control for period-specific effects for each of the three groups of canton. The effects are thus identified only from comparing municipalities with different tax rates within cantons that have the tax holiday at the same point in time. Standard errors are clustered on the level of commuting zones.

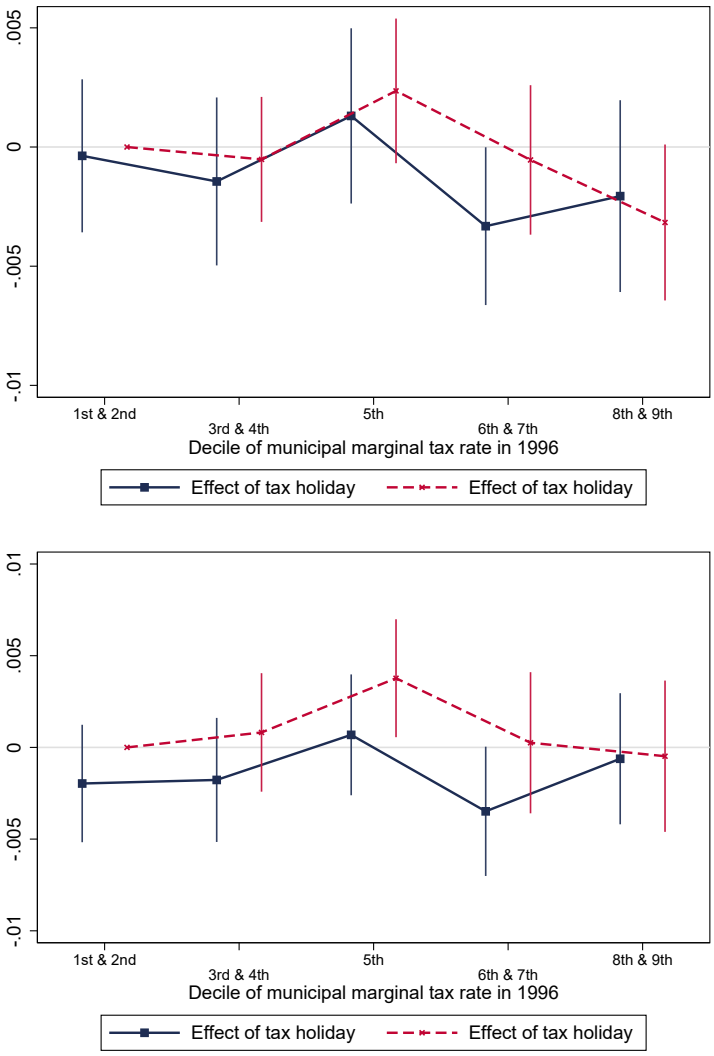


Figure 14: Effects of Tax Holiday on Employment of Wage Earners Exploiting Cross-Sectional Variation in Tax Rates: Males (top), Females (bottom)

Notes: The figure displays estimated effects and associated 95% confidence of the blank year on employment of wage earners by municipal tax burden for men (top) and women (bottom). The dependent variable is a dummy equal to 1 if a person has positive wage earnings in a given year and zero otherwise. The results are derived from individual-level regressions of employment on person fixed effects, year fixed effects, and an indicator for the blank year interacted with five indicators equal to 1 if an individual's municipality of residence belongs to the respective group in terms of tax burden. Municipalities are assigned to these five groups based on the mean average tax of all workers living there in 1996. The estimation sample covers the years 1990–2010 (excluding 1998) and comprises two groups of cantons which transitioned in 2001 and 3 cantons which transitioned in 2003. We focus on workers aged 20–55 in 1996 and drop workers older than 62 in later years. Controls are age and age squared and canton-specific linear time trends. In the specification termed "Canton-group period FE + interactions with tax rates", we also control for period-specific effects for each of the three groups of canton. The effects are thus identified only from comparing municipalities with different tax rates within cantons that have the tax holiday at the same point in time. Standard errors are clustered on the level of commuting zones.

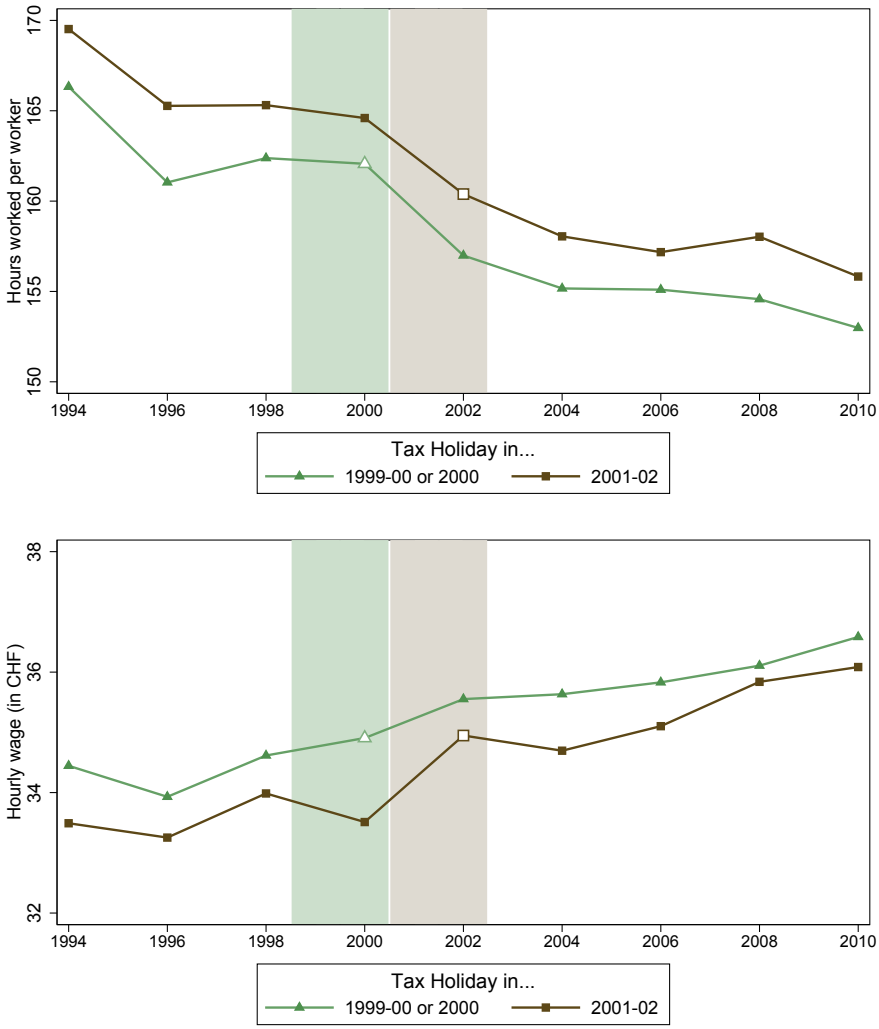


Figure 15: Effects on Hours (top) and Wage Rates (bottom) from Employer Survey

Notes: This figure uses the wage structure surveys (LSE) carried out bi-annually to depict hours of work (top panel) and hourly wage rates (bottom panel) by year and group of cantons. Hours of work and hourly wages are based on the month of October in each year. Hours worked refer to contractual (i.e. normal) hours worked for workers with monthly wages and to actual hours worked for workers paid by the hour. Wage rates incorporate regular pay but exclude overtime and variable pay components (e.g. bonuses). In both panels, the sample in each year is limited to workers aged 20–60 excluding public sector employees (workers from NACE rev. 1.2 two-digit industries 75, 80, and 85) and foreign workers who do not pay regular taxes in Switzerland (workers with resident permits with a duration of less than 10 years). We group cantons as usual by when they experienced their tax holiday. In the series, the dots corresponding to tax holidays are bigger and are blanked out (as tax holidays are called blank years in French and German). Geographical information in the wage structure survey is based on place of work while tax treatment is based on residence. To reduce the number of cases where a person works in one group of cantons but resides in another one, we exclude zip codes in which more than 25% of workers live and work in different groups of cantons according to the census in 2000.

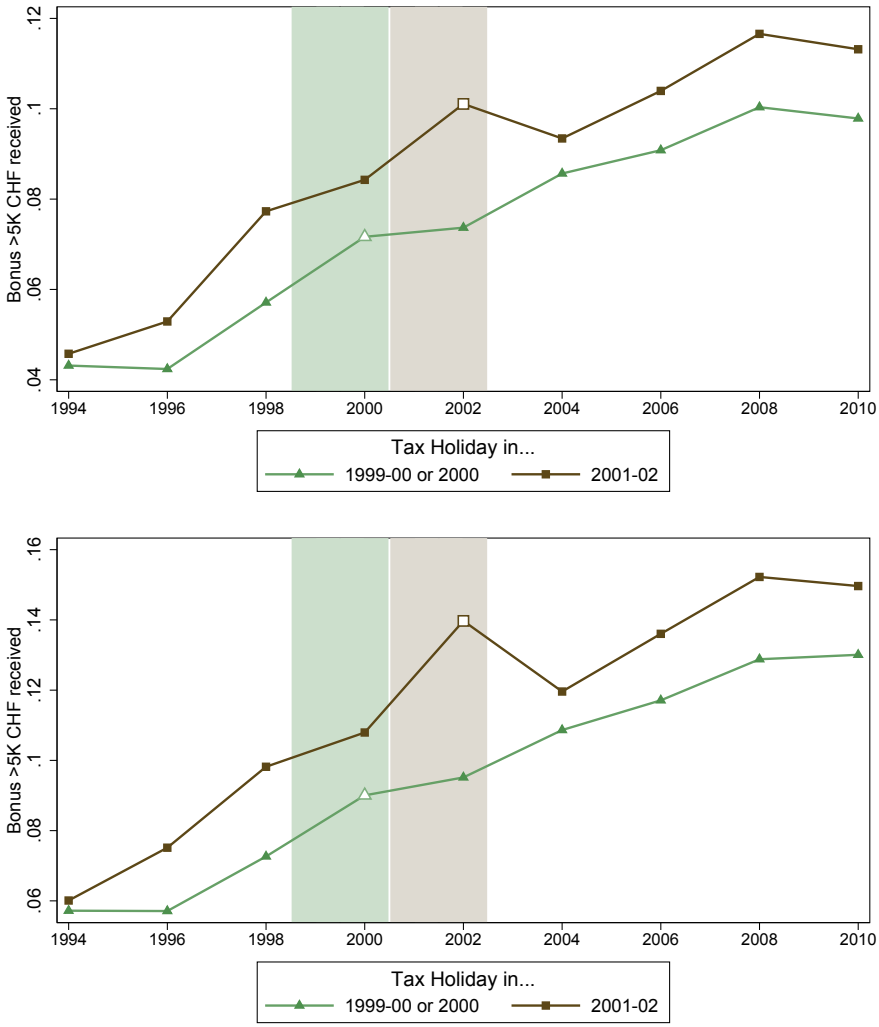


Figure 16: Effects on Bonuses: All Workers (top) and Male Workers in Private Sector (bottom)

Notes: This figure displays the fraction of employees with bonuses above 5,000 in 2010 CHF by year and groups of cantons from 1994 to 2010 using the wage structure surveys (LSE) carried out bi-annually. The sample in a given year t in the top panel includes all employees aged 20–60, excluding public sector employees (workers from NACE rev. 1.2 two-digit industries 75, 80, and 85) and foreign workers that do not pay regular taxes in Switzerland (workers with resident permits with a duration of less than 10 years). The bottom panel is restricted to male workers in private sector firms. We consider two groups of cantons: (a) cantons which transitioned in 2001 with a tax holiday for 2000 or 1999-2000 (in green), (b) 3 cantons which transitioned in 2003 with tax holiday in 2001–02 (in brown). Geographical information in the data is based on place of work while tax treatment is based on residence. To reduce the number of cases where a person works in one group of cantons but resides in another one, we exclude zip codes in which more than 25% workers stem from one of the other groups of cantons according to the census in 2000. In the series, the dots corresponding to tax holidays are bigger and are blanked out (as tax holidays are called blank years in French and German).

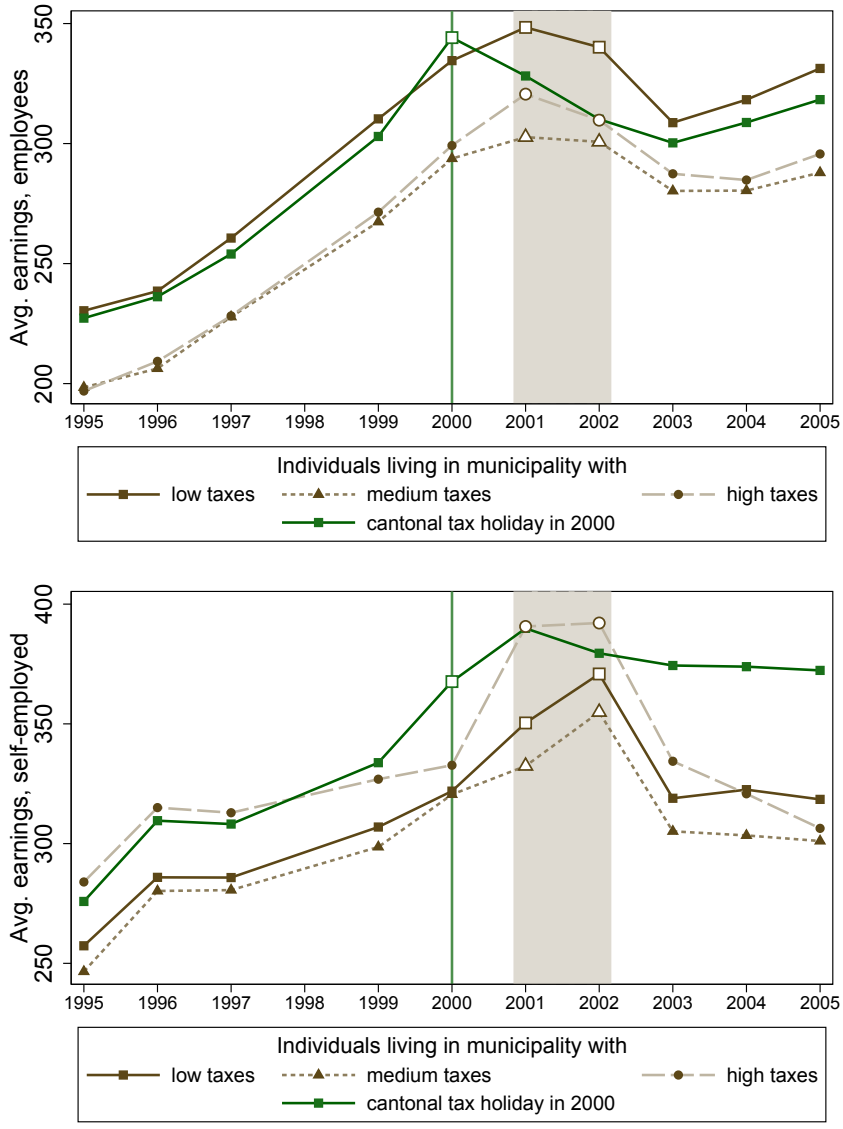


Figure 17: Effects on High Earners in Low vs. High Tax Areas: Wage Earnings (top) and Self-Employment Earnings (bottom)

Notes: This figure displays average wage earnings (top) and average self-employment earnings (bottom) by year and regions from 1995 to 2005. The sample in a given year t is all individuals aged 20–60 in year t who are still alive and Swiss residents by 2010 (i.e., present in the 2010 Census) and had average annual labor earnings (wages plus self-employment) above 200,000 CHF in 1994–1996. Earnings are expressed in 1000s of 2010 CHF (adjusted for inflation). We consider two groups of cantons: (1b) 4 cantons which transitioned in 2001 with a tax holiday for 2000 only for local income taxes and 1999-00 for the federal tax (in darker green), (3) 3 cantons which transitioned in 2003 with tax holiday in 2001-02 (in brown). Group (3) is further split into three subgroups of municipalities based on the level of taxes in each area: (a) low marginal taxes in 2000 (squares, solid line), (b) medium marginal taxes in 2000 (triangles, dotted line), (c) and high marginal taxes in 2000 (circles, dashed line). The first stage differences in marginal tax rates is depicted in appendix Figure A18. In the series, the dots corresponding to tax holidays are bigger and are blanked out (as tax holidays are called blank years in French and German). For each of the two groups, we represent the corresponding tax holiday periods using the vertical shading and the same color code.

Table 1: Descriptive Statistics

	(1) **Mean**	(2) **sd**	(3) **p1**	(4) **p99**	(5) **N**
Panel A: Matched SSER-Census					
Share employed (in %)	85.4	35.4	0.0	100	70512787
Share self-employed (in %)	8.5	27.8	0.0	100	70512787
Annual wage earnings (in CHF)	46857.0	54288.6	0.0	208588	70512787
Annual self-employment earnings (in CHF)	4754.2	30863.9	0.0	110600	70512787
Average tax rate (in %)	11.3	6.0	0.0	27	58532675
Marginal tax rate (in %)	21.1	9.0	0.0	40	58532675
Individual characteristics in 2000					
Age	39.86	11.086	20	60	3382185
Female	0.50	0.500	0	1	3382185
Married	0.60	0.490	0	1	3382185
Children aged 0–5	0.23	0.553	0	2	3118631
Children aged 6–15	0.43	0.800	0	3	3118631
Swiss national	0.87	0.332	0	1	3382185
Tertiary education	0.23	0.421	0	1	3041090
Secondary education	0.60	0.491	0	1	3041090
Panel B: Employer Survey (LSE)					
Earnings in October (in CHF)	6426.3	3670.3	372.2	21135.3	5901025
Hourly wage in October (in CHF)	37.8	16.3	17.1	102.7	5901023
Hours worked in October	159.1	43.0	13.3	199.3	5901025
Share of workers with bonus > 5k (in %)	11.3	31.7	0.0	100.0	5901025

Notes: The table presents mean, standard deviation (sd), and the 1st (p1) and 99th (p99) percentile of the main variables used in the empirical analysis. We focus on individuals aged 20–60 in every year, excluding foreign workers who do not pay regular taxes in Switzerland. All cantons in Switzerland are included. Panel A is based on the SSES-Census data. The sample in the upper half covers all person-year observations between 1990 and 2010 from individuals who are still alive and Swiss residents by 2010. The lower half of panel A shows descriptives of individual characteristics in 2000. Panel B is based on the Employer Survey (Wage Structure Survey, *LSE*) and thus focuses on employed persons only. The sample covers all worker-year observations from all surveys between 1994 and 2010 (the survey is carried out every 2 years). Public sector employees are excluded. "Share employed" ("share self-employed") is the fraction of individuals in the sample with positive earnings (self-employment earnings) during the year. The average and the marginal tax rate are computed for employed persons only. Tax rates include federal, cantonal, and municipal income taxes. We use tax rates based on household income for married individuals with two children in case a person is married, and tax rates for singles in case a person is single. "Monthly earnings" refer to the month of October in each year and include regular salaries and overtime and other variable pay components (e.g. bonuses). Hourly wages refer to month of October and incorporate regular pay but exclude overtime and variable pay components (e.g. bonuses). Hours of work are based on the month of October and refer to contractual (i.e. normal) hours worked for workers with monthly wages and to actual hours worked for workers paid by the hour. See section A.2 in the online appendix for more information on these data and variables.

Table 2: Effects of Tax Holiday on Participation and Earnings of Employees

VARIABLES	(1) Employee 0/1 Men	(2) Average wage earnings Men	(3) Employee 0/1 Women	(4) Average wage earnings Women
Panel A: **Entire sample**				
$ln(1-\tau_{it})$	-0.006	3,397	-0.015	369
	(0.005)	(376)	(0.006)	(235)
Effect of TH on $ln(1-\tau_{it})$	0.115	0.248	0.107	0.239
	(0.002)	(0.004)	(0.002)	(0.004)
Frisch elasticity η^F	-0.01 (0.006)	0.04 (0.004)	-0.02 (0.008)	0.01 (0.005)
Observations	11,838,260	9,952,854	12,143,005	8,687,931
Individual FE	Yes	Yes	Yes	Yes
Period FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Panel B: **Married w/ children**				
$ln(1-\tau_{it})$	0.002	3,788	-0.000	1,666
	(0.004)	(584)	(0.011)	(282)
Frisch elasticity η^F	0.00 (0.005)	0.04 (0.005)	0.00 (0.015)	0.04 (0.008)
Panel C: **Married no children**				
$ln(1-\tau_{it})$	-0.009	3,547	-0.011	396
	(0.004)	(499)	(0.003)	(161)
Frisch elasticity η^F	-0.01 (0.004)	0.03 (0.004)	-0.02 (0.005)	0.01 (0.003)
Panel D: **Tertiary edu.**				
$ln(1-\tau_{it})$	-0.009	5,683	-0.021	891
	(0.006)	(656)	(0.009)	(439)
Frisch elasticity η^F	-0.01 (0.007)	0.04 (0.005)	-0.03 (0.010)	0.01 (0.006)
Panel E: **Non-tertiary edu.**				
$ln(1-\tau_{it})$	-0.007	2,073	-0.013	247
	(0.004)	(218)	(0.006)	(168)
Frisch elasticity η^F	-0.01 (0.005)	0.03 (0.003)	-0.02 (0.008)	0.01 (0.004)

Notes: The table summarizes the effect of the tax holiday on the labor supply of employees. It shows estimated semi-elasticities and corresponding Frisch elasticities derived from individual-level IV regressions of labor supply outcomes on person and year fixed effects and $ln(1-\tau_{it})$, where τ is the average tax rate in column (1) and the marginal tax rate in the other columns. $ln(1-\tau_{it})$ is instrumented with an indicator variable which is 1 in the year in which municipal and cantonal taxes are zero due to the tax holiday. The effect of the tax holidays (TH) on $ln(1-\tau_{it})$ (the first stage) is reported for the total sample in panel A. The estimation sample covers the years 1990–2010 (excluding 1998) and comprises two groups of cantons which transitioned in 2001, and 3 cantons which transitioned in 2003. We focus on workers aged 20–55 in 1996 and drop workers older than 62 in later years. The dependent variable in columns (1) and (3) is an indicator whether a person has positive wage income in a given year. The dependent variable in columns (2) and (4) is average wages of persons with with positive wage income in a given year. Columns (1) and (2) focus on men, columns (3) and (4) on women. Panel A reports effects for all men and women, respectively Panels B and C report effects for married individuals with or without at least one child aged 15 or less. Panels C and D report effects depending on individuals highest educational attainment in 2000 (as reported in the census 2000). Controls are age and age squared by gender and canton-specific linear time trends. Individuals are assigned to cantons based on where they lived in 1996. Standard errors are clustered on the level of commuting zones. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 3: Regression Analysis of Tax Holiday Effects on Labor Supply (Macro Estimates)

	(1) Employment rate (in %) Men	(2) Wage earnings per worker Men	(3) Employment rate (in %) Women	(4) Wage earnings per worker Women
Panel A: Total sample				
Effect of TH	-0.028	1.115**	0.020	0.173
	(0.243)	(0.450)	(0.412)	(0.194)
% Δy	-0.0%	1.4%	0.0%	0.4%
% $\Delta[1-\tau]$	13.3%	27.8%	12.7%	26.6%
Frisch elasticity η^F	**-0.00**	**0.05****	**0.00**	**0.02**
SE	**0.022**	**0.020**	**0.044**	**0.017**
Panel B: Married w/ children				
Effect of TH	0.024	1.658	-0.117	0.277
	(0.279)	(1.020)	(0.706)	(0.356)
% Δy	0.0%	1.8%	-0.2%	0.9%
% $\Delta[1-\tau]$	12.3%	28.8%	13.0%	29.9%
Frisch elasticity η^F	**0.00**	**0.06**	**-0.01**	**0.03**
SE	**0.026**	**0.037**	**0.082**	**0.039**
Panel C: Married no children				
Effect of TH	0.001	1.536**	0.256	0.277
	(0.211)	(0.632)	(0.488)	(0.320)
% Δy	0.0%	1.6%	0.4%	0.7%
% $\Delta[1-\tau]$	16.0%	33.3%	16.0%	33.0%
Frisch elasticity η^F	**0.00**	**0.05****	**0.02**	**0.02**
SE	**0.016**	**0.020**	**0.044**	**0.023**
Observations	60	60	60	60
Canton group FE	Yes	Yes	Yes	Yes
Period FE	Yes	Yes	Yes	Yes

Notes: The table presents estimates of the labor supply effects of the tax holiday (TH) based on regressions of the aggregate time series for the 3 groups of cantons on year dummies, canton group dummies, and an indicator which is 1 in the year in which municipal and cantonal taxes are zero. OLS standard errors are reported. The estimation sample covers the years 1990–2010 (excluding 1998). The outcome in columns (1) and (3) is the share of wage earners in the population (in %). The outcome in columns (2) and (4) is the average annual wage per employee with positive wage earnings (in 1000 CHF). Columns (1) and (2) focus on men, columns (3) and (4) on women. Panel A is estimated using the full sample of adults aged 20–60. Panels B and C report effects for married individuals aged 20–60 with and without children, respectively. % Δy indicates the implied percent change in the outcome by dividing the estimated effect by the average level of the outcome variable in the year just before the tax holiday. The Frisch elasticity η^F is estimated by dividing % Δy by the estimated percent change in net-of-tax wage rates (% $\Delta[1-\tau]$) due to the tax holiday for the respective group. % $\Delta[1-\tau]$ is based on changes in average tax rates in column (1) and on changes in marginal tax rates in the remaining columns. For each individual, %$\Delta[1-\tau]$ is computed based on hypothetical marginal or average tax rates on the actual income earned during the tax-free years in the tax system in place prior to the tax holidays.

Table 4: Labor Supply Effects by Pre-Holiday Labor Income Groups

VARIABLES	(1) Employee 0/1 Men	(2) Average wage earnings Men	(3) Employee 0/1 Women	(4) Average wage earnings Women
Panel A: 1–25k CHF				
$ln(1-\tau_{it})$	-0.000	417	-0.015	-148
	(0.018)	(666)	(0.009)	(352)
Frisch elasticity η^F	0.00 (0.024)	0.01 (0.014)	-0.02 (0.011)	-0.01 (0.013)
Panel B: 25–50k CHF				
$ln(1-\tau_{it})$	0.004	1,677	-0.015	633
	(0.006)	(265)	(0.005)	(181)
Frisch elasticity η^F	0.00 (0.007)	0.03 (0.004)	-0.02 (0.006)	0.01 (0.004)
Panel C: 50–100k CHF				
$ln(1-\tau_{it})$	-0.005	2,148	-0.012	339
	(0.003)	(234)	(0.007)	(299)
Frisch elasticity η^F	-0.01 (0.003)	0.03 (0.003)	-0.01 (0.007)	0.00 (0.003)
Panel D: 100–200k CHF				
$ln(1-\tau_{it})$	-0.000	6,889	-0.009	2,126
	(0.006)	(720)	(0.013)	(1,537)
Frisch elasticity η^F	0.00 (0.006)	0.04 (0.004)	-0.01 (0.013)	0.02 (0.009)
Panel E: More than 200k CHF				
$ln(1-\tau_{it})$	0.002	27,543	-0.048	31,537
	(0.006)	(5,234)	(0.043)	(14,144)
Frisch elasticity η^F	0.00 (0.007)	0.07 (0.013)	-0.07 (0.060)	0.10 (0.042)

Notes: The table summarizes the effect of the tax holiday on the labor supply of employees. It shows estimated semi-elasticities and corresponding Frisch elasticities derived from individual-level IV regressions of labor supply outcomes on person and year fixed effects and $ln(1-\tau_{it})$, where τ is the average tax rate in column (1) and the marginal tax rate in the other columns. $ln(1-\tau_{it})$ is instrumented with an indicator variable which is 1 in the year in which municipal and cantonal taxes are zero due to the tax holiday. The effect of the tax holidays (TH) on $ln(1-\tau_{it})$ (the first stage) is reported for the total sample in panel A. The estimation sample covers the years 1995–2006 (excluding 1998) and comprises two groups of cantons which transitioned in 2001 and 3 cantons which transitioned in 2003. We focus on workers aged 22–55 in 1996 and drop workers older than 62 in later years. The dependent variable in columns (1) and (3) is an indicator whether a person has positive wage income in a given year. The dependent variable in columns (2) and (4) is average wages of persons with with positive wage income in a given year. Columns (1) and (2) focus on men, columns (3) and (4) on women. Individuals are assigned to Panels A–E based on their average annual labor income in the 1994–1996 period. Controls are age and age squared by gender and linear time trends by canton. Individuals are assigned to cantons based on where they lived in 1996. Standard errors are clustered on the level of commuting zones.

Table 5: Labor Supply Effects by Pre-Holiday Labor Income Groups (Macro Estimates)

	(1) Employment rate (in %)	(2) Earnings per person	(3) Wage earnings per worker
Panel A: 1–25k CHF			
Effect of TH	-0.216	0.261	0.411
	(0.388)	(0.405)	(0.707)
% $\Delta[1-\tau]$	10.2%	22.1%	22.1%
Frisch elasticity η^F	**-0.03**	**0.04**	**0.05**
SE	**(0.045)**	**(0.064)**	**(0.093)**
Panel B: 25k–50k CHF			
Effect of TH	-0.355	0.313	0.373
	(0.260)	(0.413)	(0.493)
% $\Delta[1-\tau]$	12.4%	26.8%	26.8%
Frisch elasticity η^F	**-0.03**	**0.02**	**0.03**
SE	**(0.023)**	**(0.032)**	**(0.036)**
Panel C: 50k–100k CHF			
Effect of TH	-0.206	0.722	0.576
	(0.226)	(0.414)	(0.511)
% $\Delta[1-\tau]$	15.4%	32.1%	32.1%
Frisch elasticity η^F	**-0.01**	**0.03***	**0.02**
SE	**(0.015)**	**(0.016)**	**(0.019)**
Panel D: 100k–200k CHF			
Effect of TH	-0.173	3.705	3.010
	(0.358)	(1.116)	(1.327)
% $\Delta[1-\tau]$	22.8%	45.3%	45.3%
Frisch elasticity η^F	**-0.01**	**0.05*****	**0.04****
SE	**(0.016)**	**(0.016)**	**(0.019)**
Panel E: More than 200k CHF			
Effect of TH	-0.238	20.183	16.736
	(0.332)	(9.012)	(7.570)
% $\Delta[1-\tau]$	35.4%	56.9%	56.9%
Frisch elasticity η^F	**-0.01**	**0.09****	**0.09****
SE	**(0.010)**	**(0.041)**	**(0.040)**
Observations	60	60	60
Canton group FE	Yes	Yes	Yes
Period FE	Yes	Yes	Yes

Notes: The table presents estimates of the tax holiday (TH) on labor supply based on regressions of the aggregate time series for the 3 groups of cantons on year dummies, group dummies, and an indicator which is 1 in the year in which municipal and cantonal taxes are zero. The estimation sample covers the years 1990–2010 (excluding 1998) and individuals aged 20–60. The outcome in column (1) is the employment rate (in %). The outcome in column (2) is annual labor earnings per person (including individuals with zero earnings) in 1000 CHF (1 CHF = \$1 approximately). The outcome in column (3) is the average wage per worker in 1000 CHF. Individuals are assigned to Panels A–E based on their average annual labor income in the 1994–1996 period. Individuals with zero earnings in 1994–1996 are dropped. The Frisch elasticity η^F is estimated by dividing % Δy (i.e. the estimated effect relative to the average level of the outcome variable in the year just before the tax holiday) by the estimated percent change in net-of-tax wage rates (% $\Delta[1-\tau]$) due to the tax holiday for the respective group. % $\Delta[1-\tau]$ is based on changes in average tax rates in column (1) and on changes in marginal tax rates in the remaining columns. For each individual, $\%\Delta[1-\tau]$ is computed based on hypothetical marginal or average tax rates on the actual income earned during the tax-free years in the tax system in place prior to the tax holidays.

Table 6: Effects of Tax Holiday on Earnings of Self-Employed

VARIABLES	(1) Earnings per self-employed All	(2) Earnings per self-employed Men	(3) Earnings per self-employed Women	(4) Earnings per self-employed High earners
Panel A: Entire sample				
$ln(1-\tau_{it})$	8,762	12,089	2,236	30,314
	(1,805)	(2,534)	(717)	(3,987)
Effect of TH on $ln(1-\tau_{it})$	0.222	0.225	0.216	0.352
	(0.011)	(0.011)	(0.011)	(0.018)
Frisch elasticity η^F	0.24 (0.049)	0.25 (0.054)	0.13 (0.041)	0.22 (0.028)
Observations	8,360,975	5,526,276	2,834,699	938,522
Individual FE	Yes	Yes	Yes	Yes
Period FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Panel B: Married				
$ln(1-\tau_{it})$	11,361	16,204	1,709	33,657
	(1,990)	(2,876)	(682)	(4,328)
Frisch elasticity η^F	0.27 (0.047)	0.29 (0.052)	0.11 (0.042)	0.23 (0.030)
Panel C: Tertiary education				
$ln(1-\tau_{it})$	17,114	21,415	6,294	32,991
	(2,207)	(3,012)	(1,352)	(4,501)
Frisch elasticity η^F	0.26 (0.034)	0.27 (0.038)	0.19 (0.040)	0.20 (0.027)
Panel D: Non-tertiary education				
$ln(1-\tau_{it})$	4,628	7,074	467	24,528
	(1,822)	(2,554)	(974)	(6,758)
Frisch elasticity η^F	0.18 (0.072)	0.22 (0.077)	0.04 (0.080)	0.27 (0.074)

Notes: The table summarizes the effect of the tax holiday on earnings of self-employed. It shows estimated semi-elasticities and corresponding Frisch elasticities derived from individual-level IV regressions of labor supply outcomes on person and year fixed effects and $ln(1-\tau_{it})$, where τ is the marginal tax rate. $ln(1-\tau_{it})$ is instrumented with an indicator variable which is 1 in the year in which municipal and cantonal taxes are zero due to the tax holiday. The effect of the tax holidays (TH) on $ln(1-\tau_{it})$ (the first stage) is reported for the total sample in panel A. The estimation sample covers the years 1990–2010 (including 1998) and comprises one canton that transitioned in 1999, two groups of cantons which transitioned in 2001, and 3 cantons which transitioned in 2003. We focus on workers aged 22–55 in 1996 that are self-employed at least once in the estimation period. We exclude workers older than 62 in later years. The dependent variable is annual self-employment income per person with with positive self-employment income in a given year. Column (1) uses the total sample, (2) focuses on men, (3) on women and (4) on high-income self-employed, defined as individuals with an average total labor income of at least 100k in the 1994–1996 period. Panel A reports effects for all men, women, and high-income individuals, respectively. Panel B reports effects for individuals married in 1996. Panels C and D report effects depending on individuals highest educational attainment in 2000 (as reported in the census 2000). Controls are age and age squared by gender and linear time trends by canton. Individuals are assigned to cantons based on where they lived in 1996. Standard errors are clustered on the level of commuting zones.

Table 7: Effect of Tax Holiday on Earnings, Wage Rates, Hours Worked, and Bonus Payments (Wage Structure Survey)

VARIABLES	(1) Earnings	(2) Hourly wage	(3) Hours worked	(4) Bonus 5K+
Panel A: All workers				
Effect in blank year	0.090*	0.395*	0.433	0.007
	(0.045)	(0.192)	(0.434)	(0.005)
$\%\Delta y$	1.5%	1.2%	0.3%	10.5%
Panel B: Individual contract				
Effect in blank year	0.136	0.540	1.232***	0.013
	(0.079)	(0.352)	(0.329)	(0.008)
$\%\Delta y$	2.2%	1.5%	0.8%	13.7%
Panel C: Collective agreement				
Effect in blank year	0.028	0.173	-0.645	0.003
	(0.059)	(0.223)	(0.676)	(0.006)
$\%\Delta y$	0.5%	0.5%	-0.4%	8.1%
Panel D: Examining\Advising\Attesting				
Effect in blank year	0.384***	1.794***	0.867	0.021
	(0.090)	(0.377)	(0.850)	(0.029)
$\%\Delta y$	4.5%	3.9%	0.5%	7.3%
Observations	18	18	18	18
Canton group FE	Yes	Yes	Yes	Yes
Period FE	Yes	Yes	Yes	Yes

Notes: The table presents estimates of the tax holiday on labor supply and wages based on regressions of aggregate time series for two groups of cantons (cantons which transitioned in 2001 and 3 cantons which transitioned in 2003) on year dummies, group dummies, and an indicator which is 1 in the year in which municipal and cantonal taxes are zero. The estimation is based on the wage structure surveys (LSE) 1994–2010 carried out bi-annually so that the total number of observations in each regression in 18. OLS standard errors are reported. The dependent variable in column (1) is monthly earnings in 2010 CHF in October of each year. Earnings include regular salaries and overtime and other variable pay components (e.g. bonuses). The dependent variable in column (2) is hourly wages, computed from October salaries in each year, excluding overtime and variable pay components (e.g. bonuses). The dependent variable in column (3) is employer-reported hours worked per worker in October. Hours worked refer to contractual (i.e. normal) hours worked for workers with monthly salaries and to actual hours worked for workers with hourly wages. The dependent variable in column (4) is the fraction of employees with bonuses above 5,000 in 2010 CHF. Panel A reports results for all employees aged 20–60 with Swiss passport or residency permit C in the dataset, excluding public sector employees. Panel B is restricted to workers with individual wage contract. Panel C is restricted to workers falling under a collective (firm-, occupation-, or industry-wide) bargaining agreement. Panel D is restricted to workers in jobs with the main activities examining, advising, and attesting.

Table 8: Robustness Checks: Specification and Data Construction

VARIABLES	(1) Employee 0/1 All	(2) Average wage earnings Men	(3) Average wage earnings Women	(4) Earnings per self-employed All
Panel A: Baseline				
$ln(1-\tau_{it})$	-0.010	3,397	369	8,174
	(0.005)	(376)	(235)	(1,697)
Frisch elasticity η^F	-0.01 (0.006)	0.04 (0.004)	0.01 (0.005)	0.23 (0.048)
Panel B: No controls				
$ln(1-\tau_{it})$	-0.020	4,923	1,315	8,309
	(0.007)	(820)	(211)	(2,327)
Frisch elasticity η^F	-0.03 (0.008)	0.05 (0.008)	0.03 (0.004)	0.24 (0.066)
Panel C: Controlling for income shifting				
$ln(1-\tau_{it})$	-0.010	3,626	627	7,917
	(0.006)	(543)	(213)	(1,751)
Frisch elasticity η^F	-0.01 (0.007)	0.04 (0.005)	0.01 (0.004)	0.22 (0.050)
Panel D: Controlling for unemployment				
$ln(1-\tau_{it})$	-0.014	3,441	810	7,378
	(0.012)	(1,231)	(599)	(1,720)
Frisch elasticity η^F	-0.02 (0.014)	0.03 (0.012)	0.02 (0.011)	0.21 (0.048)
Panel E: No imputed				
$ln(1-\tau_{it})$	-0.012	3,493	335	11,705
	(0.004)	(379)	(213)	(2,168)
Frisch elasticity η^F	-0.01 (0.005)	0.04 (0.004)	0.01 (0.004)	0.30 (0.056)
Panel F: Only second year				
$ln(1-\tau_{it})$	-0.006	3,833	374	12,917
	(0.005)	(568)	(94)	(2,238)
Frisch elasticity η^F	-0.01 (0.007)	0.04 (0.006)	0.01 (0.002)	0.37 (0.064)
Panel G: Only 2001/02				
$ln(1-\tau_{it})$	0.004	3,356	545	6,916
	(0.013)	(1,895)	(634)	(1,630)
Frisch elasticity η^F	0.00 (0.016)	0.04 (0.019)	0.01 (0.013)	0.19 (0.046)
Panel H: Uncapped earnings				
$ln(1-\tau_{it})$	-0.010	3,490	387	7,739
	(0.005)	(473)	(208)	(2,169)
Frisch elasticity η^F	-0.01 (0.006)	0.04 (0.004)	0.01 (0.004)	0.21 (0.061)
Panel I: Including 1998				
$ln(1-\tau_{it})$	-0.011	3,399	368	8,174
	(0.005)	(397)	(280)	(1,697)
Frisch elasticity η^F	-0.01 (0.007)	0.04 (0.004)	0.01 (0.005)	0.23 (0.048)

Notes: The table illustrates the robustness of our main results. It presents semi-elasticities derived from individual-level IV regressions of labor supply outcomes on person and year fixed effects and $ln(1-\tau_{it})$, where τ is the average tax rate in column (1) and the marginal tax rate in the other columns. $ln(1-\tau_{it})$ is instrumented with an indicator variable which is 1 in the year in which municipal and cantonal taxes are zero due to the tax holiday. The dependent variable in column (1) is an indicator whether a person has positive wage income in a given year. The dependent variable in columns (2) and (3) is average wages of males (column 2) and females (column 3) with positive wage income in a given year. The dependent variable in columns (4) is annual self-employment income per person (including 0) in a given year. The first panel presents our baseline results (see Tables 2 and 6 for the definition of the estimation samples). Panel B excludes the control variables included in the baseline. Panel C contains two control variables absorbing effects of the tax holiday in the the year before and after the tax holiday, thus accounting for possible effects of the tax holidays on income shifting. In Panel D, we control for the cantonal unemployment rate (based on register data). In Panel E, we discard observations with imputed place of residence. In Panel F, the effect is only identified from the response in the second cantonal blank year, controlling for the effect in the first. Similarly, Panel G identifies the effect only from the response in late-coming cantons with tax holidays in 2001 and 2002. Panel H uses wage and self-employment incomes that are not capped at 2.5 Mio. in 2010 CHF. Panel I includes the year 1998 (dropped from the the analysis for employees). We deal with the non-random missings in 1998 by discarding individuals that are likely to be affected by the missing data problem in 1998. To this end, we identify OASI compensation offices whose number of records is 5% lower in 1998 compared to 1997 and 1999. All individuals with records from these compensation offices are then dropped from the analysis. Standard errors are clustered on the level of commuting zones. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Online Appendix

A.1 Extensive Margin and Betwixt Assessments

In this section, we describe betwixt assessments carried out to deal with large changes in economic situation under the old system and how they interact with the transition. Recall that betwixt assessments were done only when changes were permanent, which is defined as a change in work status lasting at least 2 years. Starting to work for a short period (less than 2 years) or stopping work temporarily (less than 2 years) would not trigger a betwixt assessment. As such, temporary extensive margin responses carried out during the tax holiday are not affected by betwixt assessments.

Betwixt assessments in the old system. Under the old system, when a person started or ended a job on a permanent basis, or moved permanently to a different canton during a tax period, the system adopted a temporary pay as you earn taxation (betwixt assessment) until the end of the period. Let us examine how this affects incentives for permanent entry, permanent exit, or migration.

Permanent entry. Suppose the tax period is 1995/1996 and a person had not worked in 1993/1994 and started working on July 1st, 1996 for 2000 CHF/month. In this case, there is no taxation in 1995 and the first half of 1996 (as the reference period 1993/1994 has zero earnings). In the second half of 1996, there is a betwixt assessment where the person is taxed based on her current new earnings, annualized to 2000×12=24,000 CHF. This assessment lasts for 6 months only (so that half of an annual tax on 24,000 CHF is due). In 1997/1998, the person is taxed based on her annualized income of 24,000 CHF from 1996 (i.e., the reference earnings for the 1995/1996 are taken to be the annualized earnings when the person was working). Earnings from 1997/1998 will then be taxed in 1999/2000, etc. Therefore, in the old system, new entry earnings were doubled taxed, first as pay as you earn and then during the regular next period of taxation. The best strategy to minimize double taxation is to enter with a low level of earnings so that taxes over the next tax period are based on this low basis (and let earnings ramp up over the next tax period). Empirically, we will show that entrants had indeed lower entry earnings in the old system (using the new system as a control group).

Entering during the tax holiday triggers a betwixt assessment exactly as in the old system but, in contrast to the old system, there would be no double taxation during the next period. Hence, the tax holiday also reduces the tax burden on the entry margin but it is less salient as only the second and future layer of taxation is removed. Empirical analysis (not reported) shows that the tax holiday has no significant impact on entry decisions.

Permanent exit. Symmetric incentives are created along the exit dimension.[34] Let us consider the most common case of retirement. Suppose a person earns 2000 CHF/month up to July 1, 1996 and then retires with a pension of 1000 CHF/month. In 1995 and the first half of 1996, the tax is based on average earnings of 1993 and 1994. In the second half of 1996, the person is taxed pay as you earn based on annualized pension income of 12×1000=12000 CHF. In 1997/1998 the tax will also be based on 12,000 CHF of annual pension income from the second half of 1996. Hence, initial pension income is also double taxed. This implies that the earnings while working made in 1995 and the first half of 1996 are never

[34]Under the old system, death extinguishes tax liability so that income made during one's last tax period is never taxed (and income earned during the tax period preceding death is only partly taxed while the person is still alive in her last tax period). We do not study this aspect as most people stop working well before death and death while still working is typically an unexpected event.

taxed in the old system (and the earnings for 1993/1994 are only taxed for 1.5 years out of 2, hence bear only 75% of the normal tax burden). Effectively, the old system created a tax holiday for earnings made in the tax period when leaving the labor force (and a partial tax holiday for the period before leaving the labor force). Therefore, the best strategy is to have high earnings (e.g. earn overtime or get bonuses) just before retirement.[35] Empirical analysis (not reported) of earnings prior to retirement suggests that retirees had indeed high earnings in their last tax period in the old system (using the new system as a control group).

Exiting during the tax holiday triggers a betwixt assessment exactly as in the old system. Therefore, pre-retirement earnings are taxed exactly the same in the old system and during the tax holiday transition. The only difference is about the treatment of pension income. In the old system, pension income in the first period of retirement is taxed twice while it is taxed only once during the tax holiday. We do not have access to pension income data to analyze responses of pension benefits.[36]

Migration to another canton. Migration to another canton also triggered a betwixt assessment under the old system. I.e., tax liability in the canton of origin stopped and was replaced by pay as you earn on a annualized basis in the new canton of residence. This means that earnings in the canton of origin was partially tax exempt while initial earnings in the new canton of residence would be doubled taxed. Moving during the tax holiday also triggered a betwixt assessment. As a result, riding the tax holiday waves by moving from canton to canton to follow the blank years was not a winning strategy. After the first move, the taxpayer would be assessed on her current income and hence would not benefit from the tax holiday anymore. Therefore, the tax holiday does not generate any migration incentives and we do not analyze migration responses specifically (our data do not show any evidence of migration to tax holiday cantons as expected from the tax incentives we have described).

A.2 Data Description

We are using several data sources for our empirical analysis.

A.2.1 Matched SSER-Census Data

We use a novel, matched data set in our main empirical analyses. The dataset combines the Swiss population censuses with social security data that tracks the entire labor market history of the population of Switzerland. More specifically, our data set is based on a merge between the register-based population census of Switzerland as of December 2010 (via a social security number) and 100% of the social security earnings records (SSER) from the Old-Age and Survivors' Insurance (OASI, AHV in German), covering the period 1981–2012. We further match data from the population censuses in 1990 and 2000. These older population censuses did not contain a social security number. They can thus not be merged directly to the SSER. However, the censuses were matched with the register-based census in 2010 using

[35] The timing of exit along the extensive margin is actually neutral. Exiting early in the period implies that the previous tax period earnings are almost fully exempt. Exiting late in the period implies that the current tax period earnings are exempt. Empirically, we find no effect on the timing of retirement during the tax period in the old system. The old system also encouraged people to have initially low retirement benefits.

[36] There is relatively little scope for individuals to control the level of their defined benefits pensions. However, there is more flexibility in how individuals choose to receive their defined contributions benefits from their individual pension fund accounts: they can choose the pre-defined annuity, which is taxed as income, or cash-out the capital, which is taxed with a separate one-time tax at payout. Bütler and Ramsden (2017) study the role of taxation in individual annuitization decisions.

probabilistic methods based on sex, date of birth, marital status, nationality, religion, place of residence and other variables in the course of the "Swiss National Cohort" project.[37]

Figure A4 illustrates our dataset. The underlying sample is everyone that ever generated an entry in the SSER between 1981 and 2010 and that still lives in Switzerland in 2010. Because almost everybody generates a record at some point in his or her life because contributing to the old age insurance is mandatory from age 18 onward, our data set contains 98% of the permanent population age 18 or older in 2010 (6.29 million of 6.42 million permanent residents in 2010). The merged dataset also contains information from the census 2000 for 5.18 million individuals (83% of the sample) and from the census 1990 for 4.34 million individuals (69.1%). As is illustrated by the figure, our dataset does not contain information on individuals that lived in Switzerland in 2000 or 1990 and that emigrated or died until 2010. We also do not have the census 2000 information in our linked dataset for 7.9% of individuals that participated in the census 2000 and in principle still live in Switzerland in 2010. The reason is that for certain individuals participating in the census 2000, there was no unique probabilistic match between the census 2000 and the census 2010 (see Spoerri et al., 2010, for a discussion of the reasons).

Figure A5 shows the share of individuals aged 20–60 present in our SSER-census data relative to the actual population aged 20–60 in a given year. The latter data are taken from the official population statistics of the Federal Statistical Office. Our data covers 98% of all individuals aged 20–60 in 2010. As we move back in time, the sample coverage of persons aged 20–60 gets slightly smaller because certain individuals that lived in Switzerland in these earlier years died or emigrated and hence are not in the 2010 census. The figure shows that our matched data set contains 92% of all individuals aged 20–60 living in Switzerland in 2000. For 92% of these individuals, we have data from the census 2000.

In the SSER data, employed or self-employed individuals generate one record per job per year that details the starting and ending month of an employment relationship along with the total earnings over that time period. For example, a person with two different employers and also some self-employment income would generate three records.[38] Finally, the register also contains contributions of non-employed individuals (e.g. students) because contributions to the old-age scheme are mandatory from age 20 onward until reaching the statutory retirement age. The statutory retirement age was 65 for men throughout our sample period. For women, it was increased from 62 to 63 in 2001 and to 64 in 2005 as part of the 10th OASI reform implemented in 1997. Besides the retirement age, the reform increased compulsory coverage of non-employed married and widowed women below retirement age, who had been exempt from annual contributions towards the OASI before.

In Figure A6, we compare the employment rate of 20 to 64 year-old Swiss men and women in our data with the employment rate of these groups according to the SLFS. We observe that the employment rates are slightly higher in our data than they are in the SLFS. The likely reason is that the employment rate in the SLFS refers to the second quarter of each year, while we define a person as employed in a given year if she or he has positive earnings in at least one month of the year.

While the data hence covers the near universe of the population of Switzerland, the matched data set has some disadvantages, too. First, the earnings records in 1998 are incomplete. The share of wage earners for which records are missing is about 5%. It is not entirely clear why these records are missing (see the discussion below). The missing records prevent us from analyzing aggregate outcomes in 1998, as the problem of missing records does not affect all cantons to the same extent. Second, the register-based census 2010 does not contain information on some variables of interest normally available

[37] Spoerri et al. (2010) contains an extensive discussion of this data linkage.

[38] Moreover, the data contain individual records for unemployment benefits and disability pensions as well as income compensation allowances in the event of military service or maternity.

in census data such as schooling/education, occupation, or number of children. Such information are only available for individuals for which we could match the censuses in 1990 or 2000. For the relatively small number of individuals that we were unable to match to the census data in 2000, we only observe the characteristics of individuals as of 2010. This is a concern for characteristics that can change over time, especially an individual's place of residence, marital status and immigrant status or citizenship. The census provides information on how these characteristics changed in the past, allowing us to reconstruct the information for years prior to 2010. Nevertheless, we have to impute some of the data points making a set of assumptions. We discuss how we exploited the various variables in the census datasets in order to construct the three variables below.

Missing records in 1998. The earnings records in the year 1998 are incomplete. About 4.5–5.5% of all records are missing. Figure A7 illustrates this. The reasons for the missing observations are not entirely clear. According to statisticians of the compensation office, the missings most likely arise because one of the IT pools, which are responsible for delivering the earnings records of several equalization funds (*Ausgleichskassen*) to the federal equalization fund collecting the data, had IT problems at the time. As one IT pool handles several equalization funds, several equalization funds have missing records in 1998. The problem is that some cantons are more heavily affected by the missing data problem than others. For example, descriptive analyses suggest that the cantonal equalization funds of the cantons of St. Gallen and Fribourg were strongly affected. The problem with the missing records remained unnoticed at the time because statistics that are based on the earnings records were only published in odd years. Inquiries revealed that it would be impossible to try to recover the missing records as of today. The reason is that many affected workers are retired by now. The equalizations funds discard the data for retired workers. When using aggregate data, we thus discard observations from 1998 to ensure that our graphical analysis is not affected by this data problem.

Missing records in certain compensation offices in certain years. In a few cases, there are also compensation offices in which the records for a year other than 1998 are missing. These are usually smaller compensation offices with a small number of affiliated workers. We identified these cases by looking at detailed time series of employment rates by canton and subgroups of the population. They always lead to a large drop in the aggregate employment rate of a specific subgroup in just one year within employment rate series that are usually very smooth. In total, we identified 14 cases of missing data. Each of these cases is somewhat different. For instance, the missing data may only affect self-employment spells or only affect individuals from certain cantons within the same compensation office. In order to keep as many individuals in the sample as possible, we thus treated each of these cases separately. In general, we identified the subgroup of individuals that is likely to be affected by the problem, and then discard all spells from these individuals altogether. Due to this data cleaning, we drop 3% of all individuals from the analysis sample.

Dropping these individuals does not affect any of the aggregate results presented in the paper. In a few cases, it slightly increases the precision of the estimates.

Place of residence. The different censuses provide various pieces of information on an individual's place of residence in a given year:

- Register-based census in 2010
  - Municipality of residence in 2010

  - Year a person moved to the municipality in 2010
  - Municipality of residence in 2009, 2008 and 2005 (incomplete)
  - Municipality of residence before the one in 2010
- Census 2000
  - Municipality of residence in 2000
  - Municipality of residence in 1995
- Census 1990
  - Municipality of residence in 1990
  - Municipality of residence in 1985

We exploit all of these variables in order to assign individuals to the places they live in a given year. In case the information is inconsistent, we always prefer the information from a newer census wave. The list of variables makes clear that we know individual's place of residence for a large share of the population in certain benchmark years (i.e. 2010, 2009, 2008, 2005, 2000, and so on). The upper panel of Figure A8 illustrates this. In 2000, for instance, the place of residence is known for 93% of individuals in our sample. The first assumption when imputing locations is to assume that individuals stayed in the municipality of residence throughout the entire period if the municipality of residence does not change between in two consecutive benchmark years (e.g., 2000 and 2005). As shown in the upper panel of Figure A8, this assumption reduces the share of missing information on place of residence substantially. The next step is to assign (random) moving years if our data shows that a person moved between two consecutive benchmark years from one place to another. The final step in the imputation is to assign individuals to the last known place of residence for all years where the data is missing.[39]

We evaluated the accuracy of our imputation, exploiting that the SSER data contains identifiers of cantonal unemployment agencies if an individual receives unemployment benefits. Since the unemployed are assigned to cantonal agencies based on their canton of residence, we can compare the imputed canton of residence of registered unemployed with the canton of their unemployment agency. The lower panel of Figure A8 provides a summary of the results of this accuracy test. It shows the share of correctly assigned cantons of residence for individuals for which we actually know the canton of residence due to the information in the censuses and for all individuals, including the imputed places of residence. The figure shows that the share of correctly assigned cantons of residences is 92–94% around the year 2000.

Immigrant status. Information on the residency status of immigrants is important in our analysis because immigrants only pay taxes in Switzerland if they either have a residency permit C or obtained the Swiss citizenship. The different census datasets contain several variables that allow us reconstructing whether a person pays taxes in Switzerland in a given year.

- Register-based census in 2010
  - Nationality in 2010

[39]Two comments on this assumption are in order. First, the problem of missing information on the place of residence is smaller for older individuals, as individuals usually become more settled, the older they get. Second, the assumption is not as strong for the imputation of canton (rather than the municipality) of residence, because only 26% of the observed moves in our data occur across cantons.

  - Year of immigration to Switzerland (in case a person is foreign born)
  - Residency permit in 2010
- Census 2000
  - Nationality in 2000
  - Year of naturalization
  - Residency permit in 2000
- Census 1990
  - Nationality in 1990
  - Residency permit in 1990

All individuals that are Swiss nationals and that are born in Switzerland are considered as Swiss nationals in all years. Similarly, for a large share of foreign born in the sample, we can reconstruct with certainty whether they were Swiss or not in a given year due to the information on the year of naturalization from the census 2000.[40] The main question to answer is then whether a foreigner had a residency permit C in a given year. We first consider a foreigner to have a C permit throughout the sample period if he or she has a C permit in 1990 and/or in 2000. For the remaining individuals, we impute the missing information on the immigrant status in the years before 2010 using the year of arrival in Switzerland (reported in the 2010 census). In particular, we assume that an immigrant has a permit C or gained the Swiss passport if he or she lived in Switzerland for at least 10 years. Figure A9 provides the motivation for this approach using data from the 2010 census. Ten years after immigration 86% of all foreign born have a C permit or a Swiss passport. Moreover, we know the residence status in 2010. We can thus reassign individuals that are thought to be either Swiss citizen or C permit holders in 2010 which in fact are not.

Marital status. Marital status is an important variable as it affects both the potential labor supply response and the tax rate faced by individuals due to joint filing. The census datasets provide the following information on marital status:

- Register-based census in 2010
  - Marital status in 2010
  - Year when the marital status changed
  - Year of separation (if applicable)
- Census 2000
  - Marital status in 2000
  - Year when the marital status changed
- Census 1990
  - Marital status in 1990

[40] We also consider someone as Swiss throughout our sample period if the year of naturalization is missing but a person is Swiss according to the censuses in 1990 and/or 2000.

Figure A10 illustrates how we imputed the marital status based on the variables listed above. The figure focuses on the population aged 20–60 in a given year. Line (1) shows the number of individuals for which the marital status is known with certainty. The figure shows that the share of individuals with known civil status is 91% in 2000 and 100% in 2010. The share is smaller for years that are further away from the *next* census year. Line (2) builds on the census information but imputes missing data *between* these benchmark years. The main assumptions are the following. First, we assume no change in the marital status for the years in-between the census years if the status is unchanged between two census years. Second, if a person is single, widowed, or divorced in 1990 (2000) and married in 2000 (2010), we assume that the marital status did not change until the year of marriage as observed in the census 2000 (2010). Vice versa, if a person is married in 1990 (2000) and widowed, separated, or divorced in 2000 (2010), we assume that they were married until last date of change in the marital status in 2000 (2010). Third, for individuals with no information from the census 1990, we assume that everyone that married between 1990 and 2000 was single before, and that every divorce or widowhood between 1990 and 2000 was preceded by a marriage which started at the average marriage age (men: 30, women: 29).

For the remaining observation—those with no data from the censuses 1990/2000—, it is only possible to reconstruct the history of the marital status up to the last change as observed in the census 2010. Prior to that event, we impute the status assuming that the change in civil status recorded in the data is the only one that ever took place.[41] In our scenario, everyone was single before getting married and every divorce or widowhood was preceded by a marriage which started at the average marriage age (men: 30, women: 29). Before that age, individuals who are divorced in 2010 are assumed to have been single. For dissolved same-sex partnerships we assume that they started no earlier than the average marriage age but always later than 2006, and that before that, the person was always single. These assumptions allow assigning a marital status to almost everyone in the sample throughout the entire period 1990–2010 (i.e. close 100% of the sample aged 20 to 60, see Figure A10). We drop the very few individuals for which the marital status is unknown from our analysis sample.

A.2.2 Wage Structure Survey (LSE)

The Swiss Federal Statistical Office (FSO) has conducted the Swiss wage structure surveys (*Lohnstrukturerhebung* LSE) every two years since 1994. They are a stratified random sample of private and public firms with at least three full-time-equivalent workers from the manufacturing and service sectors in Switzerland. Excluded are (i) public sector employees in municipalities (until 2006), (ii) agricultural workers, and (iii) apprentices and interns. The surveys cover between 16.6% (1996) and 50% (2010) of total employment in Switzerland. Participation is mandatory. The surveys contain extensive information on the individual characteristics of workers and provide reliable (employer-reported) information on hours worked per worker. Moreover, they provide detailed information on the wage components of each worker, providing, among others, detailed information on bonus payments per worker.

We focus on Swiss nationals and foreign nationals with residency permit C aged 20–60. We drop a small number of observations with missing information on gender, nationality, and civil status. Moreover, we exclude public sector employees (workers from NACE rev. 1.2 two-digit industries 75, 80, and 85) since the public sector is not covered comprehensively in the surveys before 2006. One issue with these data for our analyses is that they only provide the geographical location of the work location and not the residence location. This creates measurement error for individuals who do not live in the same canton

[41] Note that we need the information on separated but not (yet) divorced individuals because they are taxed as singles.

they work. We address this problem by excluding zip codes where more than 25% workers stem from one of the other groups of cantons relevant in the analysis. Approximately 10% of all observations in the surveys are dropped due to this restriction. The commuting patterns by zip code are computed from the census in 2000.

We consider the following outcomes:

- Hours of work per worker per month: Hours of work are employer-reported and refer to the month of October in each year. Hours worked refer to contractual (i.e. normal) hours worked for workers with monthly wages (4 1/3 times weekly working time) and to actual hours worked for workers paid by the hour.
- Hourly wages: Hourly wages refer to the month of October in each year. They are computed by dividing the sum of regular gross wage earnings in October plus 1/12 of a possible 13th monthly wage payment by hours of work per worker. Wage rates thus incorporate regular pay but exclude overtime and variable pay components (e.g. bonuses).
- Earnings: Earnings refer to gross labor earnings in 2010 CHF in October of each year, including social security contributions. Earnings include regular monthly wages and overtime and other variable pay components (e.g. bonuses).
- Bonuses: Includes bonus payments, premiums, profit shares paid out to employees and other non-regular wage payments to the worker for the entire year of the survey.

A.2.3 Labor Force Survey (SLFS)

The Swiss Labor Force Survey (SLFS) is the equivalent of the US Current Population Survey. In the period of interest, this survey was conducted in the second quarter of each year. It includes about 17,000 individuals (approximately 0.5% of households) before 2002 and about 50,000 (1.5%) from 2002 onward. We focus on Swiss nationals and foreign nationals with residency permit C aged 20–60. These data have two main advantages relative to our main census-social security data. First, they provide earnings and employment information for both spouses for married individuals, which we use to estimate spousal earnings in order to estimate tax rates for married individuals. Second, they provide information on hours of work. The main drawback relative to our main data is a very small sample size (the full population data is about 100 times larger). As a result, most of the series produced with the labor force survey are very noisy compared to the population-wide data. Another drawback is that most variables are self-reported introducing significant measurement error as well.

We consider the following outcomes:

- Employment rate: fraction of people employed in the second quarter of each year as a share of the permanent population (refers to employment in the week before the survey)
- Earnings: total annual labor earnings, self-reported
- Hours of work per week: Hours effectively worked in week before the survey (refers to all jobs held), self-reported
- Hourly earnings: annual labor earnings divided by 51 times self-reported normal weekly working hours

A.2.4 Income Tax Rates Data

None of the above micro data sets includes individual's tax rates. We therefore merge the statutory tax rate for a given income in a given municipality to these data. Income tax rate data have been collected and made available by Parchet (2018) for this project. The data set is based on average effective

tax rates on gross income published by the Federal Tax Administration for the 800 (approximately) largest municipalities. These tax rates are defined as shares of the consolidated cantonal, municipal and church tax liability in gross annual income for different categories of taxpayers (unmarried, married without children, married with two children, retired) and gross income classes (from CHF 10,000 to CHF 1,000,000). Parchet (2018) has collected the municipal tax multipliers for all municipalities between 1983 and 2014 and, using the fact that intra-cantonal differences in consolidated tax rates are almost entirely due to municipal tax multipliers, has estimated the total average tax rate for all municipalities and taxpayers.

Missing Cantons. Unfortunately, tax rates cannot be estimated with this method for the cantons of Appenzell Innerhoden and Neuchâtel before 2001. In the former, multipliers are not available; in the latter, municipalities could set their own tax schedule. For these cases, predicting consolidated tax rates is not possible, nor is the estimation of the cantonal tax rate. Tax rates for these cantons are therefore missing.

Marginal Tax Rates. We linearly interpolate the tax rates in steps of 1,000 CHF between the income brackets provided in the original data. For incomes above 1 million CHF we assume a constant average tax rate. Our estimates of the marginal tax rate are based on the local changes in the tax rate in steps of 1,000 CHF.

Municipality Mergers. The consolidated tax rates and tax multipliers are published in real time for each municipality, as it exists in a given year. The location information we obtain from the Census data refers to the registers of municipalities as of November 2010. Since there has been an ongoing trend in mergers of small municipalities over time, it is not possible to perform a 1:1 match on the tax rate data. We therefore update the municipality codes in the tax rate data to match the municipality registers as of November 2010. Individuals living in a merged municipality, we assign the average tax rate of the merged municipalities. Individuals living in a newly created municipality, we assign the average tax rate that was applied on this territory prior to the secession.

A.3 Further Robustness Checks

Effects in the Labor Force Survey. Figure A13 displays various employment outcomes using the Labor Force Survey (SLFS): (a) employment rate, (b) earnings, (c) hours of work per week among employees, (d) average hourly earnings among employees. The sample in a given year t includes all individuals aged 20-60. For hours of work and hourly earnings, we restrict the sample to employees. We consider 3 groups of cantons. (1) 2 cantons which transitioned in 1999 with a tax holiday in 1998 or 1997-98 (in blue), (2) 20 cantons which transitioned in 2001 with a tax holiday in 1999-00 or 2000 (in green), (3) 3 cantons which transitioned in 2003 with tax holiday in 2001-02 (in brown). In the series, the dots corresponding to tax holidays are bigger and are blanked out (as tax holidays are called blank years in French and German). The figure does not display any tax holiday effects on these outcomes. Given the noise in the series due to small sample size, this is consistent with our previous analysis using the much larger social security data and the wage structure survey.

Early transition cantons. In the main text, we did not analyze the early tax holiday in the cantons of Zurich and Thurgau because of lack of complete data in 1998 (see above). In Figures A11 and A19, we have examined the effect of the early tax holiday in the cantons of Zurich and Thurgau. We deal with the non-random missings in 1998 by discarding individuals that are likely to be affected by the missing data problem in 1998. To this end, we identify OASI compensation offices whose number

of records is 5% lower in 1998 compared to 1997 *and* 1999. All individuals with records from these compensation offices are then dropped from the entire analysis.

Figure A11 displays the employment rate by year and groups of cantons from 1990 to 2010. The top panel is for men and the bottom panel for women. The sample in a given year t is all individuals aged 20-60 in year t who are still alive and Swiss residents by 2010 (i.e., present in the 2010 Census). The employment rate is computed as the fraction of individuals in the sample with positive earnings (either from wages or from self-employment) during the year. The two groups of cantons are: (1) 2 cantons which transitioned in 1999 with a tax holiday in 1999 for local taxes and 1999-00 for the federal tax (in blue), (2b) 4 cantons which transitioned in 2001 with a tax holiday for 2000 only for local income taxes and 1999-00 for the federal tax (in darker green). There is no visible effect on employment rates for the early transition counties.

Figure A19 displays average wage earnings (top) and average self-employment earnings (bottom) by year and groups of cantons from 1990 to 2010. The sample in a given year t is all individuals aged 20-60 in year t who are still alive and Swiss residents by 2010 (i.e., present in the 2010 Census) and had average annual labor earnings (wages plus self-employment) above 200,000 CHF in 1994-1996. Earnings are expressed in 1000s of 2010 CHF (adjusted for inflation). The two groups of cantons are: (1) 2 cantons which transitioned in 1999 with a tax holiday in 1999 for local taxes and 1999-00 for the federal tax (in blue), (2) 4 cantons which transitioned in 2001 with a tax holiday for 2000 only for local income taxes and 1999-00 for the federal tax (in darker green). The top graph provides suggestive evidence that high wage earners responded to the early tax holidays in Zurich and Thurgau. However, in contrast with our findings in the main text, there is no evidence that high self-employment earners responded to the early tax holidays.

Substitution across years. We have seen that the tax holiday did lead to increased earnings during the tax holiday especially for the self-employed and high wage earners. We analyze whether these increased earnings come at the expense of earnings in surrounding years through intertemporal substitution. To test for this, we empirically estimate whether earnings just before or just after the tax holiday are depressed (relative to control groups). Table A3 presents estimates of the tax holiday on intertemporal income shifting based on regressions of the aggregate time series for the 3 groups of cantons on year and group dummies. The covariates of interest are a dummy equal 1 in the year in which municipal and cantonal taxes are zero, and dummies for the year immediately prior and posterior to the cantonal tax holiday. The estimation sample covers all individuals aged 20–60 and the years 1990–2010, including 1998 (dropped from the rest of the tables). We deal with the non-random missings in 1998 by discarding individuals that are likely to be affected by the missing data problem in 1998. To this end, we identify OASI compensation offices whose number of records is 5% lower in 1998 compared to 1997 *and* 1999. All individuals with records from these compensation offices are then dropped from the entire analysis. The dependent variable in column (1) is annual labor earnings per person (including 0, in 1000 CHF). The dependent variable in columns (2) and (3) are the average wage per worker and the average self-employment income per self-employed in 1000 CHF, respectively. Panel A is restricted to men aged 20–60, Panel B to women aged 20-60. Individuals are assigned to Panels C and D based on their average annual labor income in the 1994–1996 period.

Overall, while the regression estimates confirm positive earnings effects during the tax holiday, all the coefficients for the year just before or just after the tax holiday are insignificant. Furthermore, there is no tendency for the coefficients to be negative. In fact, more than half of the coefficients are positive. This suggests that the extra earnings during the tax holiday do not come solely at the expense of earnings

in surrounding years through short-term retiming.

Heterogeneity. Table A4 explores heterogeneity by cantonal referendum vote (vs. legislature vote), cantonal vote date, local tax burden, language region, and local unemployment. The table examines whether the effects of the tax holiday are larger in regions that fulfill the criteria of interest in each panel. All estimations are based on regressions of aggregate time series for the three canton groups with tax holidays in 1999/2000, 2000, and 2001/2002. The dependent variable in columns (1) and (5) is the employment rate (in %). The dependent variable in columns (2) and (6) is annual labor earnings per person (in 1000 CHF, including 0). The dependent variables in columns (3) and (4) are the average wage per worker and the average self-employment income per self-employed in 1000 CHF, respectively. We use two time series per canton group if the group contains both, region for which the dummy variable of interest in each panel is zero and for which it is one. In Panel A, the dummy blank year is interacted with a dummy that is one in case a canton voted about the tax reform associated with the tax holidays. In Panel B, it is interacted with a dummy that is one in case a canton voted about the tax reform prior to the second blank year. In Panel C, it is interacted with a dummy that is one for municipalities with an average tax rate in the top 33% of municipal tax rates in 1998. In Panel D, it is interacted with a dummy that is one for municipalities with an marginal tax rate in the top 33% of municipal tax rates in 1998. In Panel E, it is interacted with a dummy that is one for French-speaking municipalities. This regression is restricted to the three cantons with both, a German- and a French-speaking region (Bern, Fribourg, and Valais). In Panel F, it is interacted with a dummy that is one for cantons with an above-average unemployment rate among cantons in 1998. Columns 1–4 are restricted to men aged 20–60, column 5 to women aged 20–60, and column 6 to individuals with annual income exceeding an average of 200k in 2010 CHF in 1994–1996.

Overall, we find that the interaction effects are not significant implying that a cantonal vote, the date of the cantonal vote, the local tax burden, the language of the region, and local unemployment rate had not a strong impact on the size of the estimates.

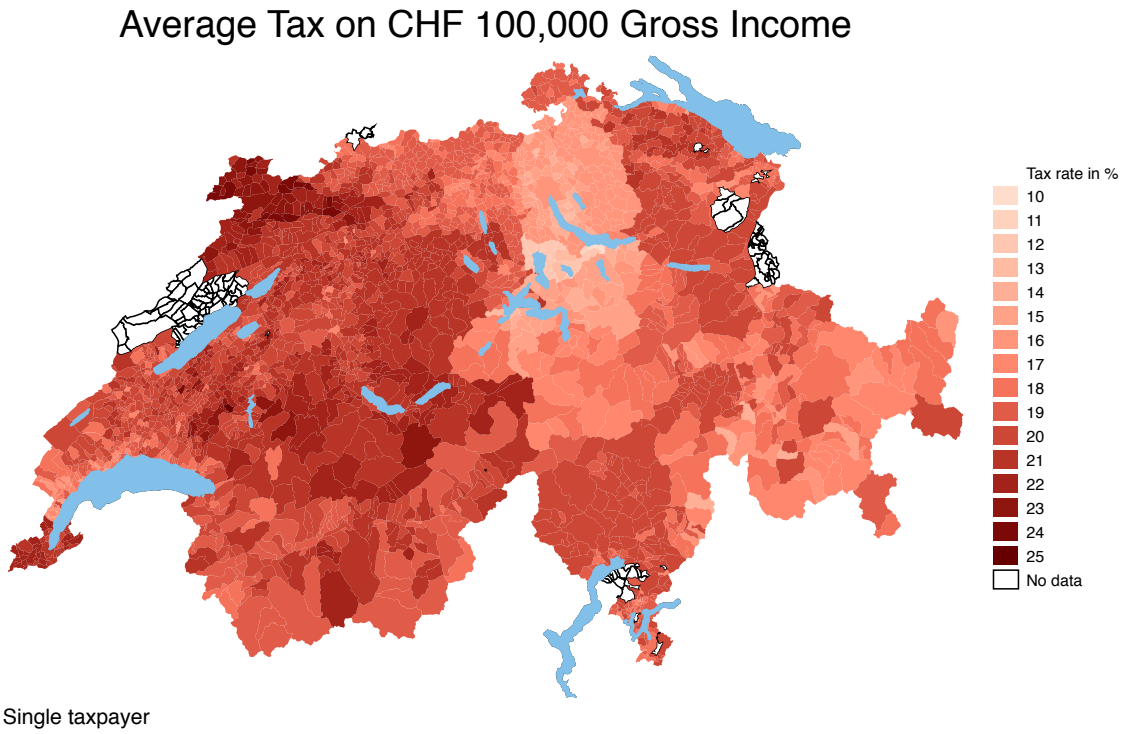


Figure A1: Average Tax Rates Across Swiss Cantons

Notes: This figure depicts the average income tax rate in 1999 across Swiss municipalities. The tax rate combines income taxes at the federal, cantonal, and municipal levels and is computed for a single tax filer with gross income of 100,000 CHF, approximately the 90th percentile of labor earnings across all Swiss workers. The average tax rate is defined as taxes owed divided by gross income. The graph shows substantial variation in tax burdens across areas with tax rates at low at 10% and tax rates as high as 25%.

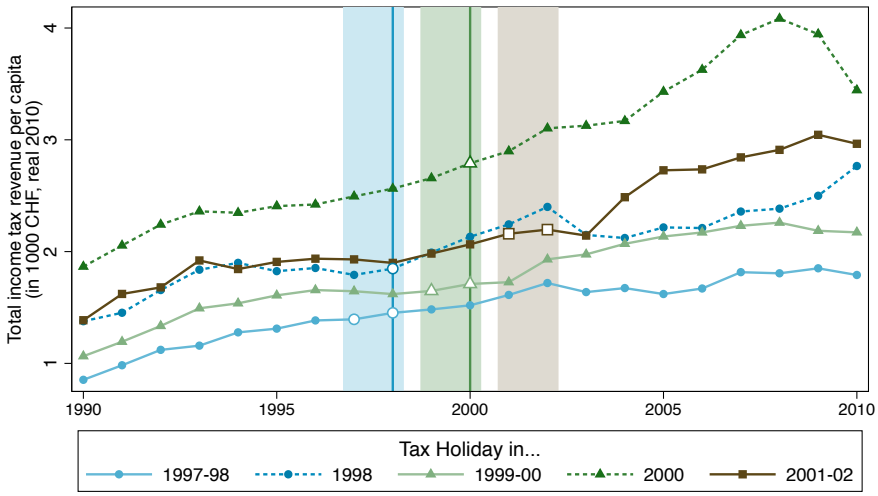


Figure A2: Individual Income Tax Collections per Capita

Notes: This figure depicts total income tax revenue per capita collected by year and groups of cantons. Amounts are expressed in thousands of 2010 CHF. The cantons are divided in five groups based on when the tax holiday took place. (1a) light blue: tax holiday in 1997-98 (1 canton), (1b) dark blue dashed: tax holiday in 1998 (1 canton), (2a) light green: tax holiday in 1999-2000 (15 cantons), (2b) dark green: tax holiday in 2000 (4 cantons), (3) brown: tax holiday in 2001-02 (3 cantons). In the series, the dots corresponding to tax holidays are bigger and are blanked out (as tax holidays are called blank years in French and German). Tax rates are naturally zero during tax holidays. Before the transitions, income tax collected in a given year typically corresponded to incomes earned in prior years. After the transition, income tax collected in a given year typically corresponds to incomes earned in the current year. The figure shows that there was no visible discontinuity in income tax collections across the tax holidays (there was no double taxation nor gap in tax collection in the transition).

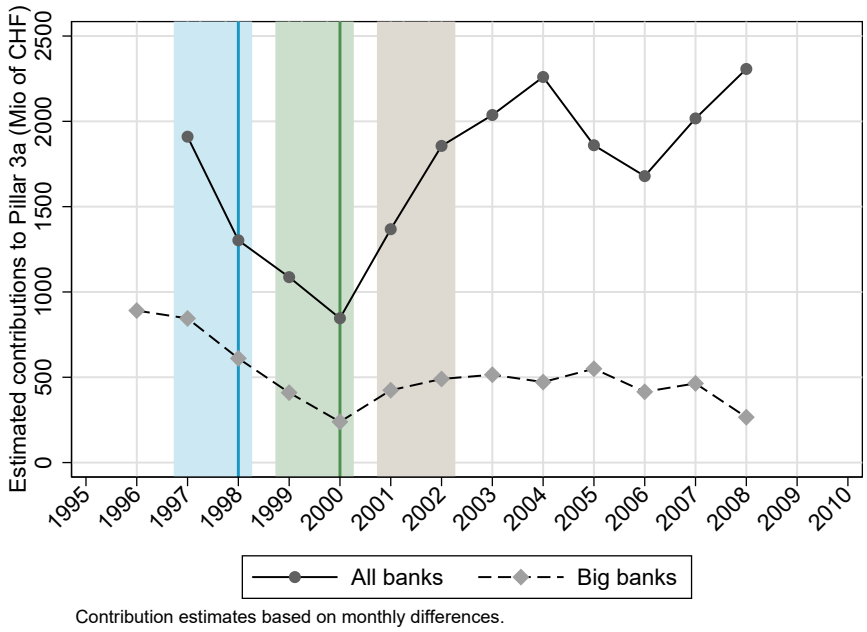


Figure A3: Effects of the Tax Holiday on Pillar 3a Pension Contributions

Notes: This figure displays pillar 3a individual pension contributions by year made through large banks and made through all banks (including the large banks). Pillar 3a pension contributions are voluntary and deductible for income tax purposes (similar to US IRA accounts). The figure shows that such contributions were significantly lower in 1999 and 2000 when most cantons had their tax holiday, consistent with a tax avoidance response whereby individuals retime their pension contributions into taxable years. Unfortunately, we do not have access to cantonal level contributions to refine this analysis. The series are produced using only information on pillar 3a balances by month since 1996. The monthly balance series show jumps in January and December implying that the vast majority of contributions are made in a lumpy way in either December or January. Hence, we estimate contributions in year t by adding the changes in balances from end of December year $t-1$ to end of January year t and from end of November year t to end of December year t.

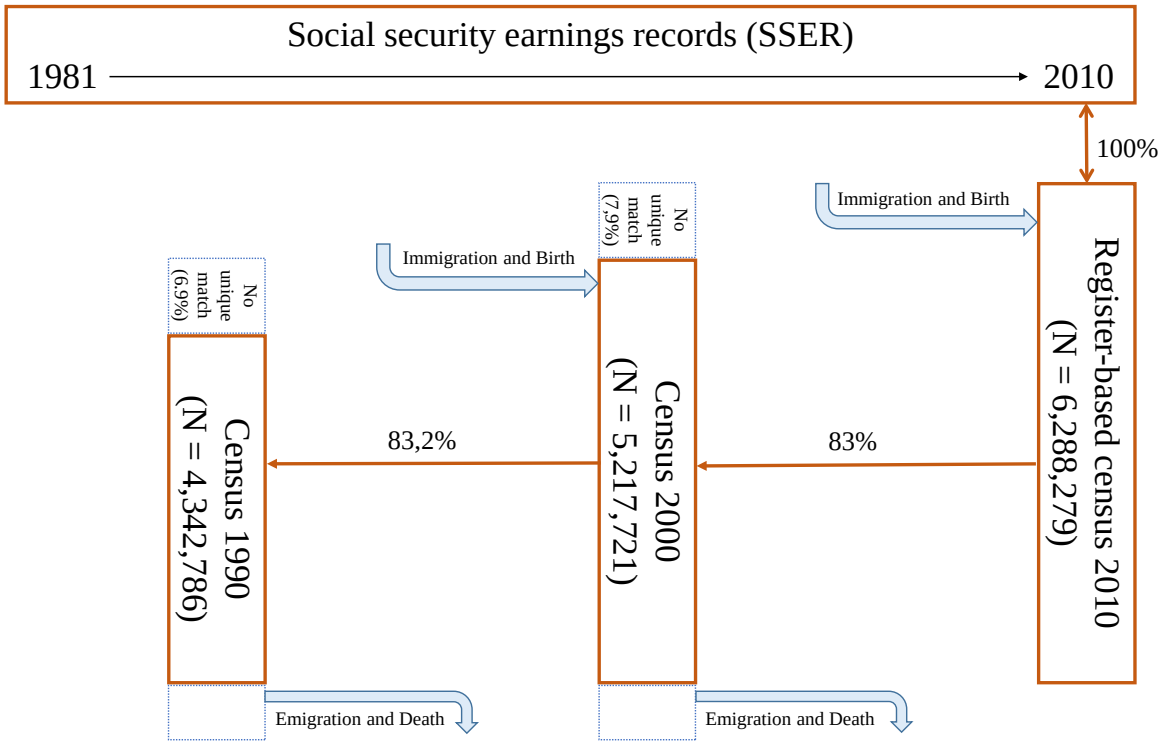


Figure A4: Illustration of matched SSER-Census data

Notes: This figure illustrates the matched SSER-census dataset. The data covers everyone that ever generated a social security record between 1981 and 2010 and that is still alive and living in Switzerland in 2010. Because contributing to the old age insurance is mandatory from age 18 onward, the 6.29 million observations in 2010 represent 98% of the actual population aged 18 and older in 2010 in Switzerland. 83% of these individuals (5.18 million individuals) could be matched to a consistent census 2000 record. 69.1% (83.2% of 83% or 4.34 million individuals) could be matched to a consistent census 1990 record.

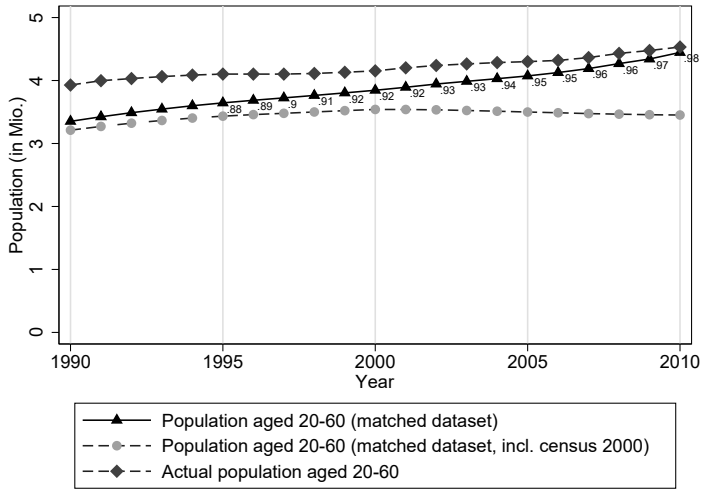


Figure A5: Sample Coverage

Notes: This figure displays the total resident population of Switzerland aged 20–60 and the total population captured by our sample aged 20–60 (which are all individuals with a social security record in any year 1990–2010 and resident in Switzerland in 2010 so that they can be matched to the Census 2010). The numbers show the fraction of individuals in our sample vs. the full population. Coverage is closer to one in recent years (due to deaths and migration).

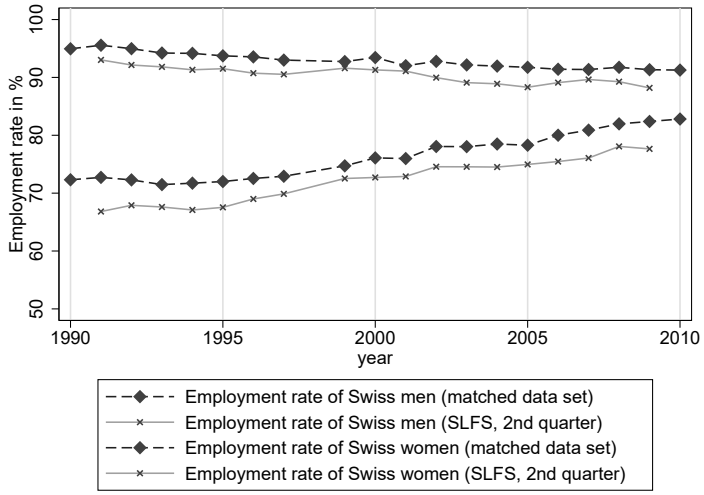


Figure A6: Accuracy of Employment Rate

Notes: This figure displays the employment rates of men and women aged 20–64 separately in our sample and in official statistics derived from the Swiss Labor Force Survey (SLFS). In our data, we count individuals as employed if they have non-zero labor earnings in a given year. The official statistics count a person as employed if she works at least one hour in the second quarter of a specific year. These differences in the measurement of employment explain the level differences between the two statistics. We omit 1998 due to the missing social security records in this year.

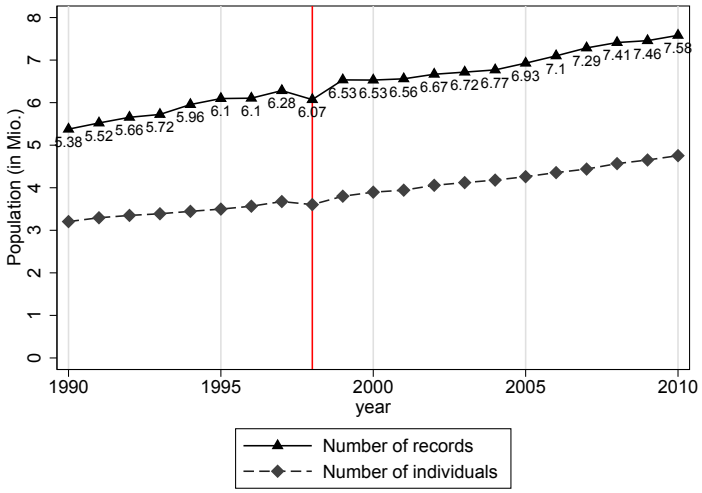
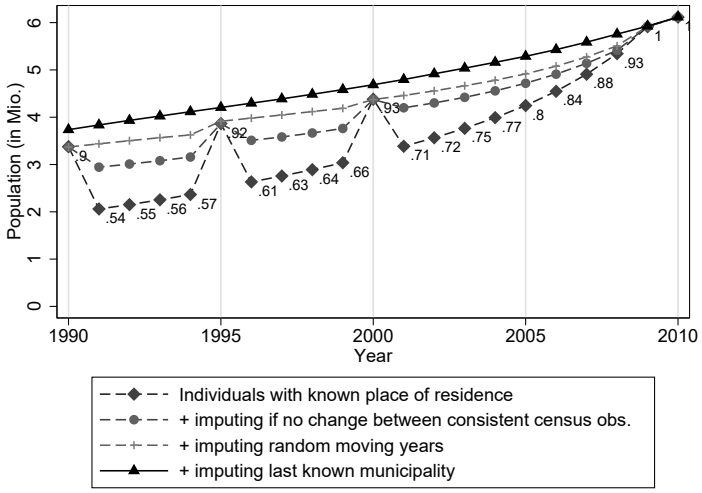
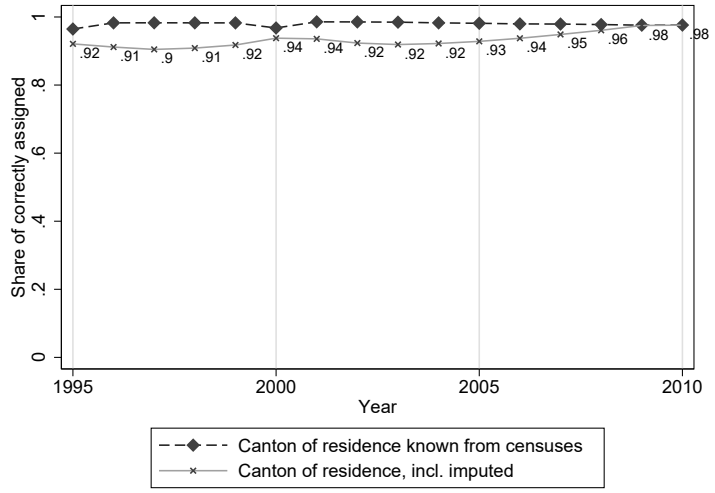


Figure A7: Missing Records in 1998

Notes: This figure displays the number of records and individuals in our data by year. It illustrates the issue of missing records in 1998 due to missing social security data for that year.



(a) Share with known place of residence



(b) Accuracy of imputed canton of residence

Figure A8: Imputation of Municipality of Residence

Notes: The figure displays statistics of the imputation of municipality of residence. The dashed line in the top panel shows the number of individuals in the SSES data set for which the place of residence is known with certainty. The second line shows the number of individuals for which the place of residence is known if we assume that individuals lived at their last known place of residence for at least 8 years. Our baseline strategy is to assign all individuals to the last known municipality (third line).
The lower panel evaluates the accuracy of our imputation for the years 1995–2010 regarding the *canton* of residence. The figure exploits that registered unemployed are assigned to cantonal agencies based on their canton of residence. The figure compares the imputed canton of residence of registered unemployed with the canton of the unemployment agency. The figure shows the share of correctly assigned cantons of residence for individuals for which we actually know the canton of residence due to the information in the census (dashed line) and for all individuals, including the imputed places of residence (straight line). The figure shows that the share of correctly assigned cantons of residences among all individuals is around 90% in 2000.

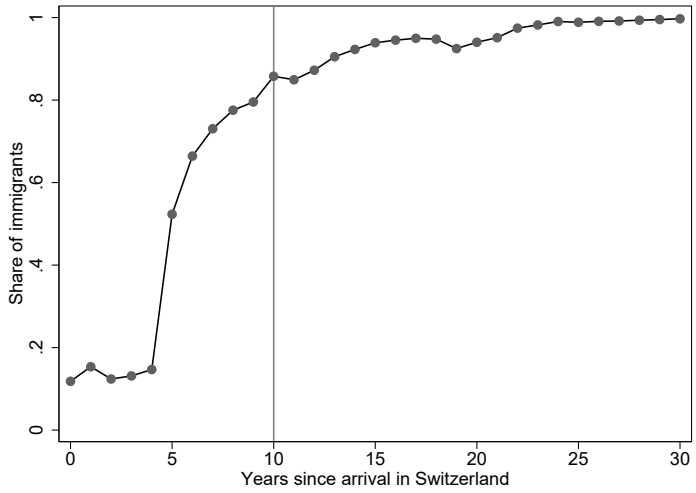


Figure A9: Share of Immigrants with C Permit or a Swiss Passport, by Duration of Stay

Notes: The figure displays the share of immigrants with C permit or a Swiss passport, by duration of stay.

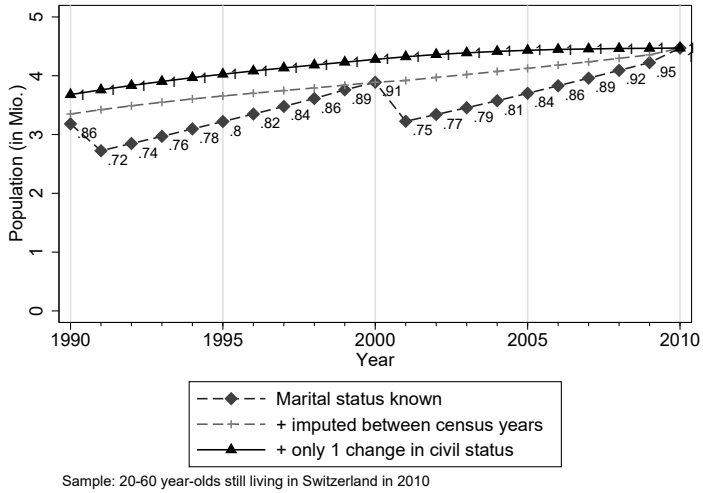


Figure A10: Marital Status Imputation

Notes: The figure displays the number of individuals in our sample for which the marital status is known based on our stepwise imputation method. We focus on the population aged 20–60 in a given year. Line (1) shows the number of individuals for which the marital status is known. The figure shows that the share of individuals with respect to the total sample aged 20–60 with known civil status lies at 91% in 2000 and almost 100% in 2010. The share becomes smaller, the further away a year from the next census year. Line (2) builds on these census information but imputes missing data between these years. In particular, we always assume no change in the marital status for the years in-between if the status is unchanged between census years. The third line imputes the marital status for the remaining individuals—those with no data from the censuses 1990/2000—by basically assuming that the change in civil status recorded in the data is the only one that ever took place. This assumption allows us imputing the marital status for almost the entire rest of the sample.

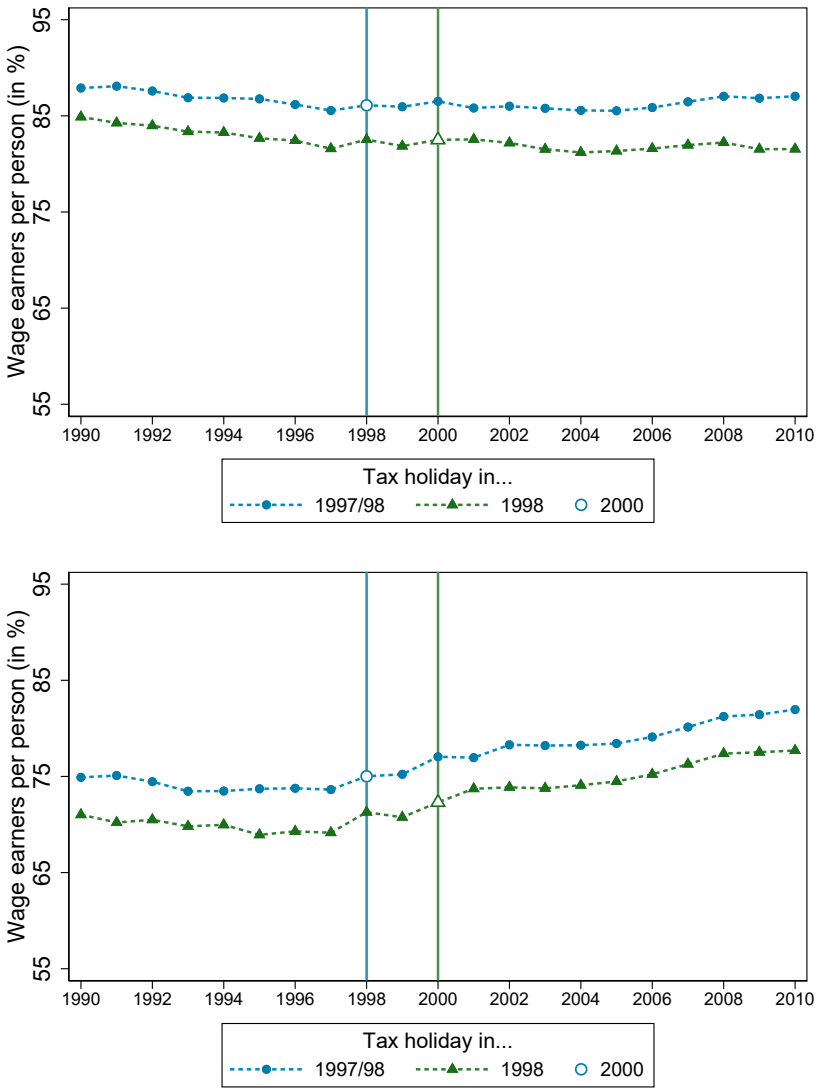


Figure A11: Effects of Early Tax Holiday on Employment of Wage Earners: Males (top), Females (bottom)

Notes: This figure displays the share of wage earners by year and groups of cantons from 1990 to 2010. 1998 earnings are partly missing in the social security data and are imputed following the method described in appendix. The top panel is for men and the bottom panel for women. The sample in a given year t is all individuals aged 20-60 in year t who are still alive and Swiss residents by 2010 (i.e., present in the 2010 Census). The share of wage earners is computed as the fraction of individuals in the sample with positive wage earnings during the year. The two groups of cantons are: (1) 2 cantons which transitioned in 1999 with a tax holiday in 1998 for local taxes and 1997-98 for the federal tax (in blue), (2b) 4 cantons which transitioned in 2001 with a tax holiday for 2000 only for local income taxes and 1999-00 for the federal tax (in darker green). For each of the two groups, we represent the corresponding tax holiday periods using the vertical shading and the same color code. In the series, the dots corresponding to tax holidays are bigger and are blanked out (as tax holidays are called blank years in French and German). There is no evidence of an employment response in 1998 to the early tax holiday.

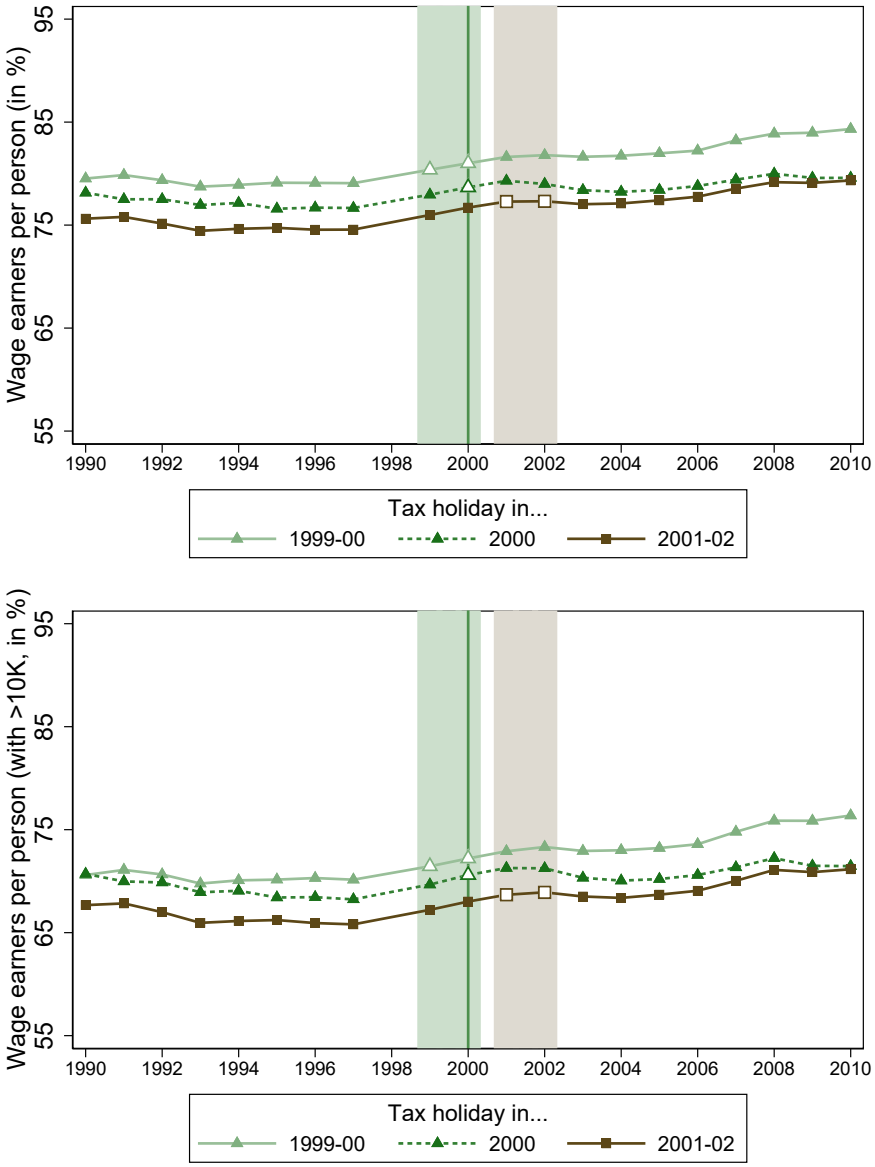
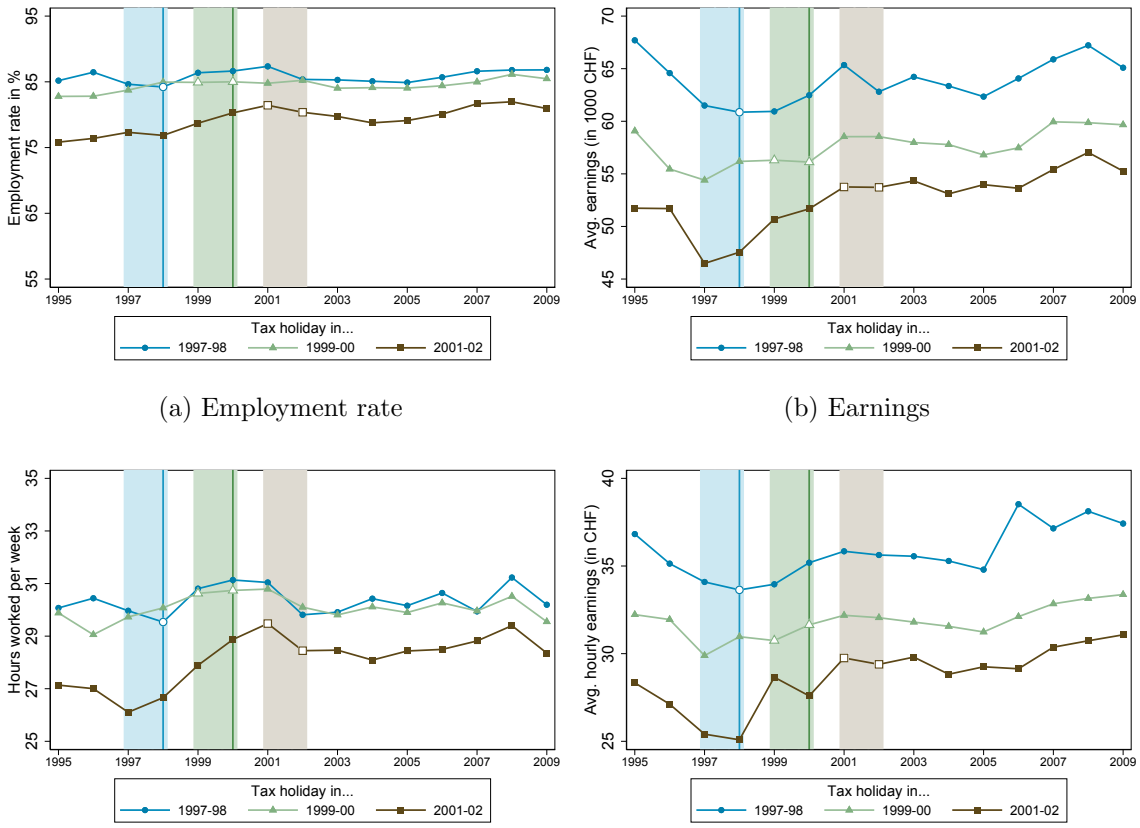


Figure A12: Robustness of Employment Effects on Wage Earners: Benchmark (top) vs. 10,000 CHF Threshold (bottom)

Notes: This figure depicts a robustness check on the employment effects from Figure 7. The top panel shows the share of wage earners (pooling together both male and females aged 20-60) where employment is defined as having any positive wage earnings during the year as in Figure 7. The bottom panel repeats the same figure but defines employment as having annual wage earnings above 10,000 CHF (instead of zero) in 2010 CHF. Both panels show the same absence of employment effects of the tax holiday. Therefore, the lack of employment effects is robust to changing the minimum threshold of earnings used to define employment.



(a) Employment rate

(b) Earnings

(c) Hours of work among employees

(d) Hourly earnings among employees

Figure A13: Evidence from the Labor Force Survey

Notes: This figure displays various employment outcomes using the Swiss Labor Force Survey (SLFS): (a) employment rate, (b) earnings, (c) hours of work per week among employees, (d) average hourly earnings among employees. The sample in a given year t includes all Swiss and foreign workers with a resident permit C aged 20-60. For hours of work and hourly earnings, we restrict the sample to employees. We consider 3 groups of cantons. (1) 2 cantons which transitioned in 1999 with a tax holiday in 1998 or 1997-98 (in blue), (2) 20 cantons which transitioned in 2001 with a tax holiday in 1999-00 or 2000 (in green), (3) 3 cantons which transitioned in 2003 with tax holiday in 2001-02 (in brown). In the series, the dots corresponding to tax holidays are bigger and are blanked out (as tax holidays are called blank years in French and German). The figure does not display any tax holiday effects on these outcomes. Given the noise in the series due to small sample size, this is consistent with our previous analysis using the much larger social security data and the wage structure survey.

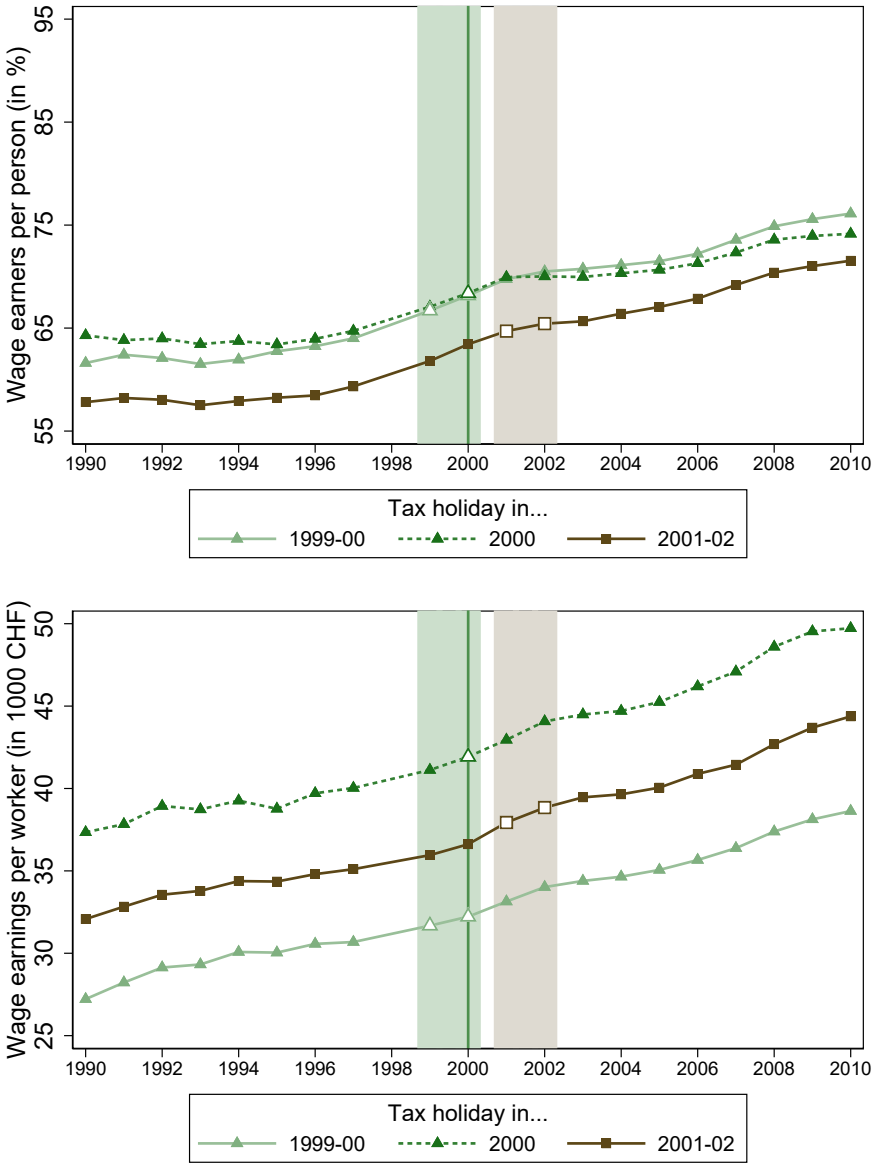


Figure A14: Effects on Married Women: Employment (top) and Wage Earnings (bottom)

Notes: This figure displays the share of wage earners (top panel) and average wage earnings excluding non-workers (bottom panel) for married women by year and groups of cantons from 1990 to 2010. The sample in a given year t is all female individuals aged 20-60 in year t and married in year t who are still alive and Swiss residents by 2010 (i.e., present in the 2010 Census). Wage earnings are expressed in 1000s of 2010 CHF (adjusted for inflation). The three groups of cantons are: (2a) 16 cantons which transitioned in 2001 with a tax holiday in 1999-00 for both the federal and local income taxes (in light green), (2b) 4 cantons which transitioned in 2001 with a tax holiday for 2000 only for local income taxes and 1999-00 for the federal tax (in darker green), (3) 3 cantons which transitioned in 2003 with tax holiday in 2001-02 (in brown). For each of the three groups, we represent the corresponding tax holiday periods using the vertical shading and the same color code. Married women are expected to be particularly responsive to taxes; yet, the figure does not show effects on employment or average wage earnings.

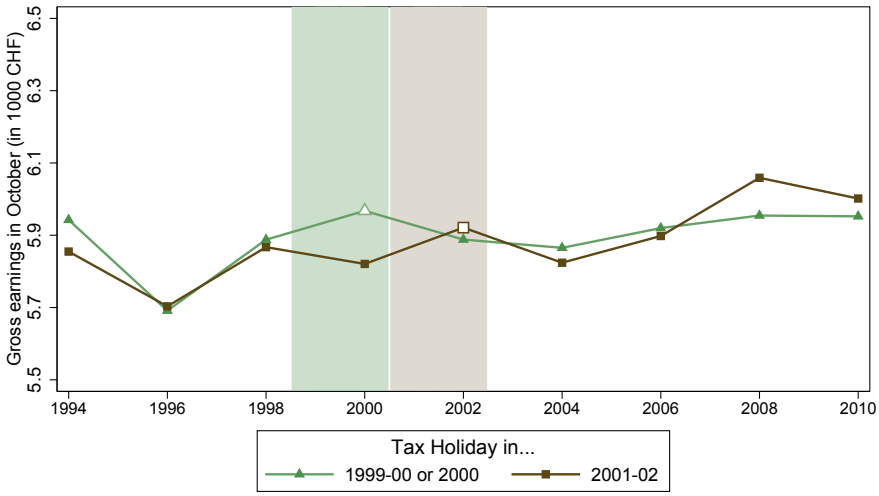


Figure A15: Effects on Monthly Earnings in Employer Survey

Notes: This figure displays monthly earnings in 2010 CHF in October for all workers by year and groups of cantons from 1994 to 2010 using the wage structure surveys (LSE) carried out bi-annually. Earnings include regular salaries and overtime and other variable pay components (e.g. bonuses). The sample in a given year t contains all workers aged 20–60 with Swiss passport or residency permit C in the dataset (excluding public sector employees) weighted to represent population averages. We consider two groups of cantons: (a) cantons which transitioned in 2001 with a tax holiday for 2000 or 1999-2000 (in green), (b) 3 cantons which transitioned in 2003 with tax holiday in 2001–02 (in brown). Geographical information in the data is based on place of work while tax treatment is based on residence. To reduce the number of cases where a person works in one group of cantons but resides in another one, we exclude zip codes in which more than 25% workers stem from one of the other groups of cantons according to the census in 2000. In the series, the dots corresponding to tax holidays are bigger and are blanked out (as tax holidays are called blank years in French and German).

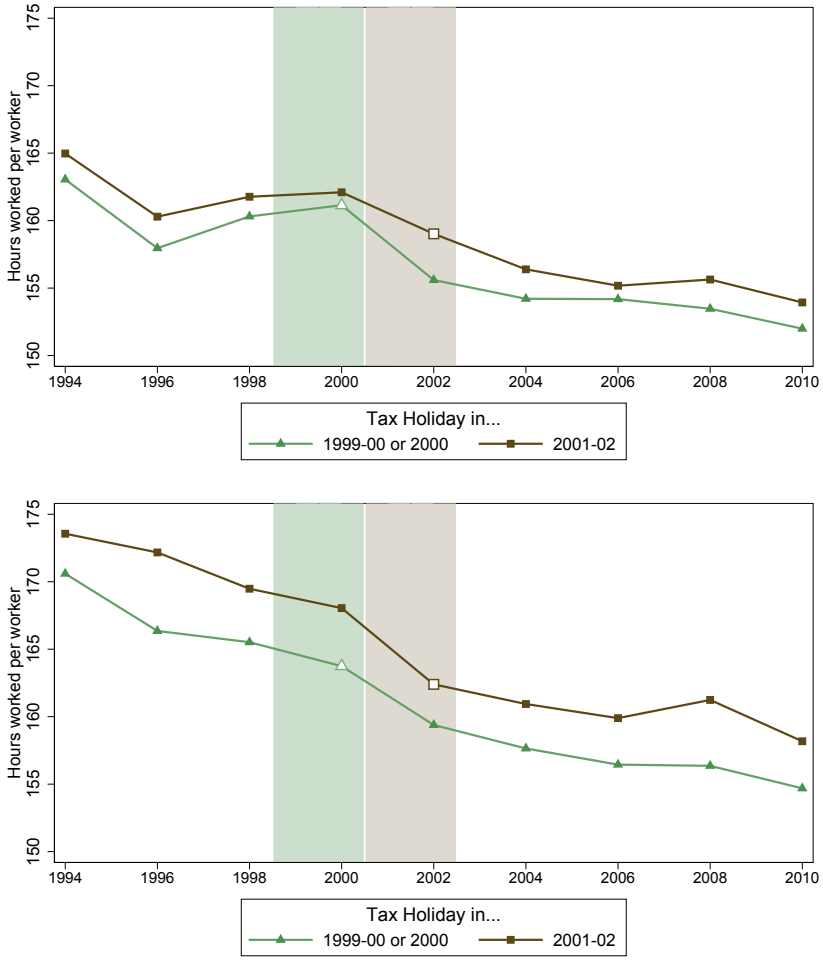


Figure A16: Effects on Hours Worked: Individual Contract (top) versus Collectively Bargained Wage Contract (bottom)

Notes: This figure displays hours worked in October for all workers by year and groups of cantons from 1994 to 2010 using the wage structure surveys (LSE) carried out bi-annually. Hours worked refer to contractual (i.e. normal) hours worked for workers with monthly wages and to actual hours worked for workers paid by the hour. The top panel shows workers that have an individual-level work contract. The bottom panel contains workers falling under a collective (firm-, occupation-, or industry-wide) bargaining agreement. The information on the nature of the work contract is directly levied in the surveys. In both cases, the sample in a given year t contains all workers aged 20–60 with Swiss passport or residency permit C in the dataset (excluding public sector employees) weighted to represent population averages. We consider two groups of cantons: (a) cantons which transitioned in 2001 with a tax holiday for 2000 or 1999-2000 (in green), (b) 3 cantons which transitioned in 2003 with tax holiday in 2001–02 (in brown). Geographical information in the data is based on place of work while tax treatment is based on residence. To reduce the number of cases where a person works in one group of cantons but resides in another one, we exclude zip codes in which more than 25% workers stem from one of the other groups of cantons according to the census in 2000. In the series, the dots corresponding to tax holidays are bigger and are blanked out (as tax holidays are called blank years in French and German). The figure shows that the labor supply response to the tax holiday is concentrated among employees with individual-level work contracts with no response at all among employees under collective agreement contracts.

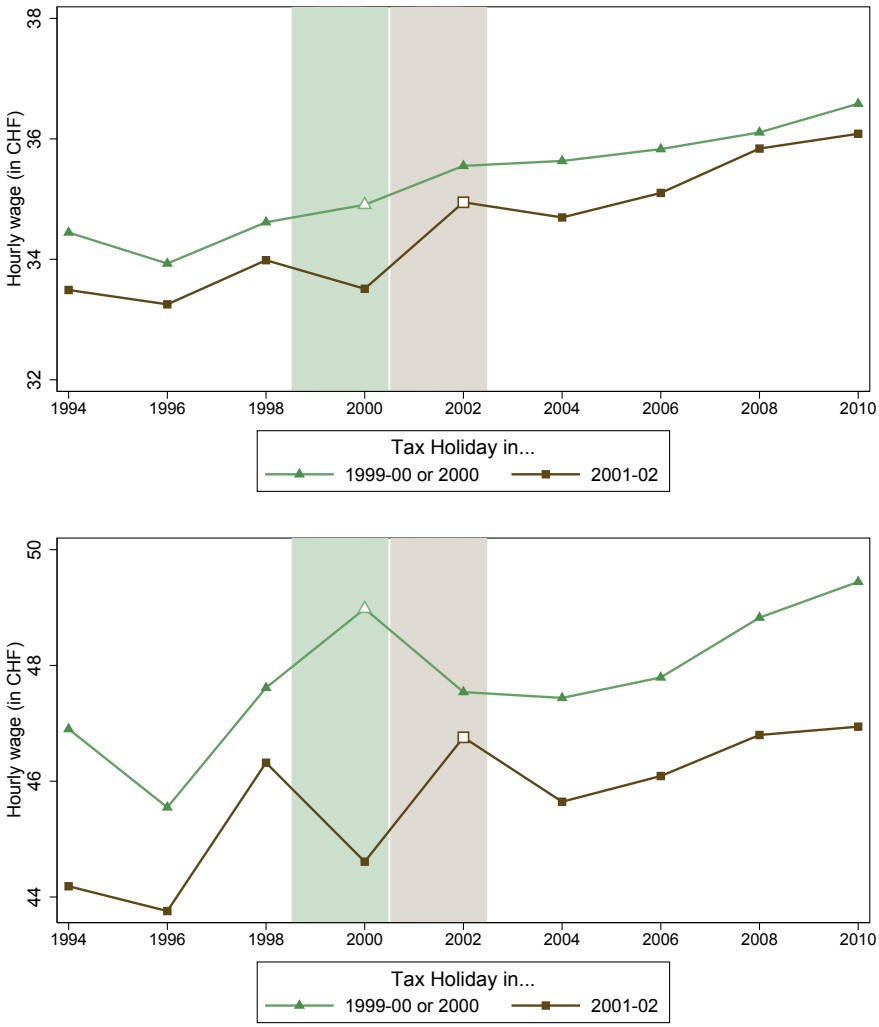


Figure A17: Effects on Hourly Wages: All Workers (top) and Workers in Job Category "Examining, Advising, and Attesting" (bottom)

Notes: This figure displays average hourly wages in 2010 CHF by year and groups of cantons from 1994 to 2010 using the wage structure surveys (LSE) carried out bi-annually. Hourly wages are computed from October salaries in each year and incorporate regular pay but exclude overtime and variable pay components (e.g. bonuses). The sample in a given year t in the top panel includes all workers aged 20–60 with Swiss passport or residency permit C in the dataset (excluding public sector employees) weighted to represent population averages. The sample in the bottom panel is restricted to workers in jobs with the main activities "examining, advising, attesting". We consider two groups of cantons: (a) cantons which transitioned in 2001 with a tax holiday for 2000 or 1999-2000 (in green), (b) 3 cantons which transitioned in 2003 with tax holiday in 2001–02 (in brown). Geographical information in the data is based on place of work while tax treatment is based on residence. To reduce the number of cases where a person works in one group of cantons but resides in another one, we exclude zip codes in which more than 25% workers stem from one of the other groups of cantons according to the census in 2000. In the series, the dots corresponding to tax holidays are bigger and are blanked out (as tax holidays are called blank years in French and German).

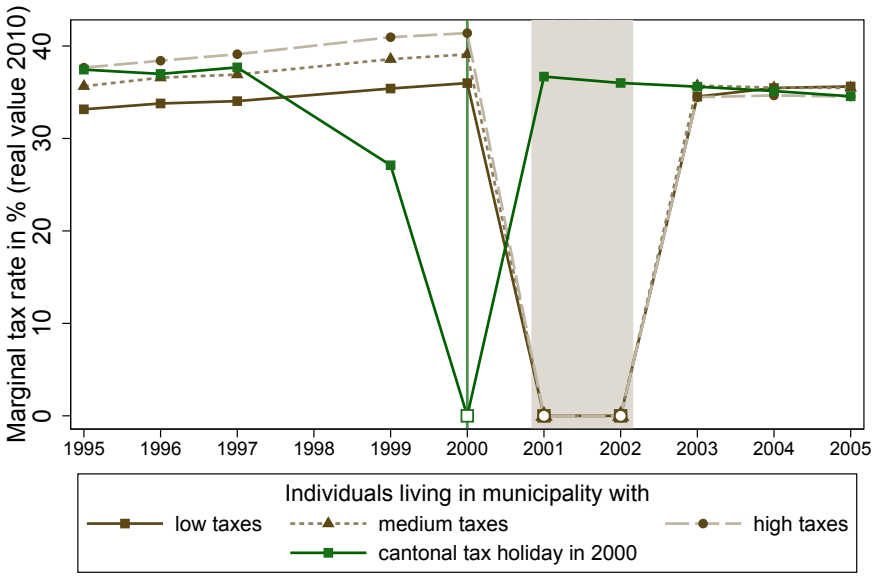


Figure A18: Marginal Tax Rates of High Earners in Low vs. High Tax Areas

Notes: This figure displays average marginal income tax rates for employed persons from 1995 to 2005 for the regions relevant in Figure 17. Tax rates include federal, cantonal, and municipal income taxes. We use tax rates based on household income for married individuals with two children in case a person is married, and tax rates for singles in case a person is single. Averages across municipalities and cantons are employment weighted. The sample in a given year t is all individuals aged 20–60 in year t who are still alive and Swiss residents by 2010 (i.e., present in the 2010 Census) and had average annual labor earnings (wages plus self-employment) above 200,000 CHF in 1994–1996. As in Figure 17, we consider two groups of cantons: (1b) 4 cantons which transitioned in 2001 with a tax holiday for 2000 only for local income taxes and 1999-00 for the federal tax (in darker green), (3) 3 cantons which transitioned in 2003 with tax holiday in 2001-02 (in brown). Group (3) is further split into three subgroups of municipalities based on the level of taxes in each area: (a) low marginal taxes in 2000 (squares, solid line), (b) medium marginal taxes in 2000 (triangles, dotted line), (c) and high marginal taxes in 2000 (circles, dashed line). In the series, the dots corresponding to tax holidays are bigger and are blanked out (as tax holidays are called blank years in French and German). For each of the two groups, we represent the corresponding tax holiday periods using the vertical shading and the same color code.

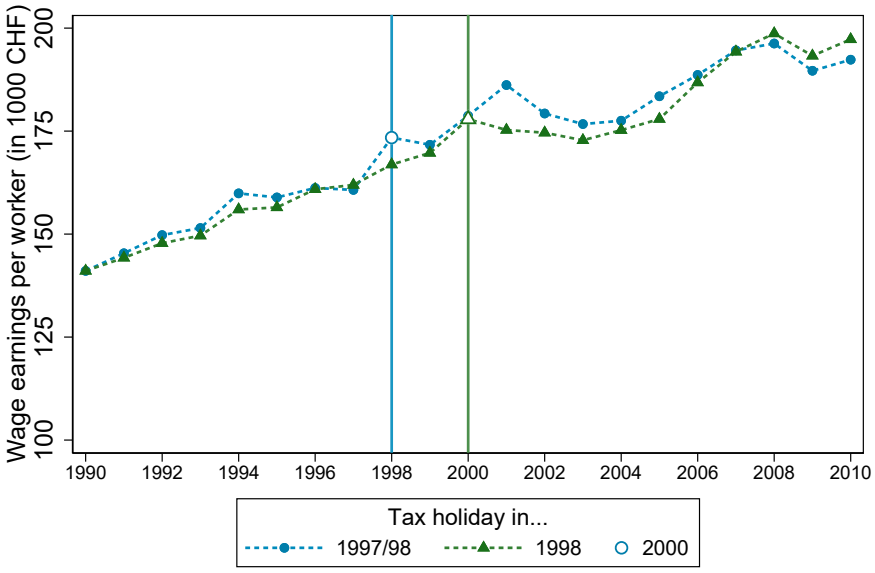


Figure A19: Wage Effects of Early Tax Holiday on High Earners

Notes: This figure displays average wage earnings by year and groups of cantons from 1990 to 2010 for high-income earners. The sample in a given year t is all individuals aged 20-60 in year t who are still alive and Swiss residents by 2010 (i.e., present in the 2010 Census) and had average annual labor earnings (wages plus self-employment) above 100,000 CHF in 1994-1996. Earnings are expressed in 1000s of 2010 CHF (adjusted for inflation). The two groups of cantons are: (1) 2 cantons which transitioned in 1999 with a tax holiday in 1999 for local taxes and 1999-00 for the federal tax (in blue), (2) 4 cantons which transitioned in 2001 with a tax holiday for 2000 only for local income taxes and 1999-00 for the federal tax (in darker green). For each of the two groups, we represent the corresponding tax holiday periods using the vertical shading and the same color code. In the series, the dots corresponding to tax holidays are bigger and are blanked out (as tax holidays are called blank years in French and German).

Table A1: Date of Cantonal Referenda and Legislative Decisions on the Reform

Holiday	Canton	Date	Share Yes	Turnout	Notes
1997-98					
	TG	6/30/97			no vote
1998					
	ZH	6/8/97	58.85	38.4	
1999-00					
	AG	4/18/99	63.17	33.3	
	AI	4/25/99			*
	BL	6/13/99	65.19	47.57	
	GR	6/13/99	77.54	36.04	
	OW	10/24/99	61.91	26.93	
	GL	5/7/00			*
	BE	5/21/00	60.86	41.72	
	AR	5/21/00			*
	UR	5/21/00	67.11	45.42	
	SH	8/27/00	70.11	59.99	
	SZ	9/24/00	81.43	45.48	
	ZG	11/26/00	69.27	45.88	
	NW**	11/26/00	77.5	41.33	
	SG	4/9/98			no vote
	LU	11/22/99			no vote
	FR	6/6/00			no vote
2000					
	SO	6/30/99			no vote
2001-02					
	VD	7/4/00			no vote
	TI	7/6/01			no vote
	VS	9/13/01			no vote

Notes: Holidays refer to the cantonal (and municipal) income tax holidays. At the federal level all cantons had a two-year holiday. See text for details. In cantons where no popular vote was held, the date refers to the date when the cantonal parliament enacted the tax transition law. Popular votes or parliament votes were the very end of processes that had typically started many months earlier.

* In these cantons, votes are held at a cantonal assembly (*Landsgemeinde*), which is why statistics are not available.

** In NW there was no cantonal holiday.

Table A2: Effect of Tax Holiday on Months Employed, Number of Jobs, and Between Canton-Group Migration

VARIABLES	(1) Jobs per employee	(2) Months employed (employees)	(3) Immigrant per person (in
Panel A: Total sample			
Effect in blank year	0.0021	0.0164	-0.023
	(0.0079)	(0.0179)	(0.045)
$\Delta\%y$	0.1%	0.1%	-4.7%
Panel B: Men			
Effect in blank year	0.0036	0.0218	-0.027
	(0.0094)	(0.0179)	(0.042)
$\Delta\%y$	0.2%	0.2%	-5.9%
Panel C: Women			
Effect in blank year	0.0002	0.0098	-0.019
	(0.0072)	(0.0200)	(0.049)
$\Delta\%y$	0.0%	0.1%	-3.7%
Panel D: Married women			
Effect in blank year	0.0019	0.0084	-0.007
	(0.0056)	(0.0310)	(0.022)
$\Delta\%y$	0.1%	0.1%	-1.5%
Panel E: Very high earners			
Effect in blank year	0.0048	-0.0130	-0.165
	(0.0136)	(0.0196)	(0.072)
$\Delta\%y$	0.2%	-0.1%	-35.8%
Observations	60	60	57
Canton group FE	Yes	Yes	Yes
Period FE	Yes	Yes	Yes

Notes: The table presents estimates of the tax holiday on labor supply of wage earners based on regressions of the aggregate time series for the 3 main groups of cantons on year dummies, group dummies, and an indicator which is 1 in the year in which municipal and cantonal taxes are zero. The estimation sample covers the years 1990–2010, excluding 1998. The dependent variable in column (1) is the number of jobs per employee. Distinct jobs are identified based on the number of distinct register entries with positive wage earnings in a given year. The dependent variable in column (2) is the number of months in employment per employee during the year. The dependent variable in column (3) is the number of persons moving into a canton of the respective canton group as a fraction of the total population (in %). Panel A reports effects for the total sample aged 20–60. Panel B and C report effects for males and females aged 20–60, respectively. Panel D reports effects for married women aged 20–60 only. Panel E reports effects for individuals with more than 200k average annual labor income in the 1994–1996 period. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table A3: Is There Missing Income in the Year Before of After the Tax Holidays?

VARIABLES	(1) Labor earnings per person	(2) Wage earnings per worker	(3) Labor earnings per self employed
Panel A: **Men**			
Effect in $t-1$	-0.276	-0.118	2.508
	(0.556)	(0.526)	(2.063)
Effect in blank year	1.381**	1.152**	7.082***
	(0.518)	(0.490)	(1.923)
Effect in $t+1$	0.248	0.579	2.339
	(0.656)	(0.620)	(2.433)
Panel B: **Women**			
Effect in $t-1$	-0.199	-0.147	0.605
	(0.205)	(0.229)	(0.926)
Effect in blank year	0.065	0.109	1.616*
	(0.191)	(0.214)	(0.863)
Effect in $t+1$	-0.051	0.063	0.468
	(0.242)	(0.270)	(1.093)
Panel C: **Earnings 100k–200k**			
Effect in $t-1$	-0.427	-0.126	6.126
	(1.539)	(1.654)	(5.944)
Effect in blank year	3.891**	3.083*	14.566**
	(1.435)	(1.542)	(5.541)
Effect in $t+1$	-0.825	0.706	5.362
	(1.815)	(1.951)	(7.011)
Panel D: **Earnings 200k+**			
Effect in $t-1$	2.810	0.718	11.563
	(12.196)	(9.933)	(14.295)
Effect in blank year	20.467*	15.532	25.729*
	(11.369)	(9.259)	(13.326)
Effect in $t+1$	0.351	-0.033	-2.843
	(14.386)	(11.717)	(16.862)
Observations	63	63	63
Canton group FE	Yes	Yes	Yes
Period FE	Yes	Yes	Yes

Notes: The table presents estimates of the tax holiday on income shifting based on regressions of the aggregate time series for the 3 groups of cantons on year and group dummies. The covariates of interest are a dummy equal 1 in the year in which municipal and cantonal taxes are zero, and dummies for the year immediately prior and posterior to the cantonal tax holiday. The estimation sample covers all individuals aged 20–60 and the years 1990–2010, including 1998 (dropped from the rest of the tables). We deal with the non-random missings in 1998 by discarding individuals that are likely to be affected by the missing data problem in 1998. To this end, we identify OASI compensation offices whose number of records is 5% lower in 1998 compared to 1997 *and* 1999. All individuals with records from these compensation offices are then dropped from the entire analysis. The dependent variable in column (1) is annual labor earnings per person (including 0, in 1000 CHF). The dependent variable in columns (2) and (3) are the average wage per worker and the average self-employment income per self-employed in 1000 CHF, respectively. Panel A is restricted to men aged 20–69, Panel B to women aged 20-69. Individuals are assigned to Panels C and D based on their average annual labor income in the 1994–1996 period.

Table A4: Heterogeneity by Cantonal Vote Date, Language Region, and Local Unemployment

VARIABLES	(1) Employee 0/1 All	(2) Average wage earnings Men	(3) Average wage earnings Women	(4)
Panel A: Vote				
Effect in TH	-0.001	1,177	251	
	(0.001)	(265)	(73)	
Blank year x Vote	-0.004	107	161	
	(0.002)	(262)	(100)	
Panel B: French-speaking				
Effect in TH	0.000	239	155	792
	(0.001)	(790)	(316)	(539)
Effect in TH x French-speaking	0.000	1,594	143	1,728
	(0.001)	(1,007)	(305)	(659)
Panel C: Cantonal unemployment				
Effect in TH	0.001	1,751	-116	2,851
	(0.001)	(1,342)	(401)	(350)
Effect in TH x Unemployment rate (1997)	-0.000	-227	185	-610
	(0.001)	(535)	(164)	(210)
Panel D: Share betwixt ass.				
Effect in TH	-0.002	1,214	304	1,892
	(0.001)	(177)	(42)	(379)
Effect in TH x Share betwixt ass.	-0.001	128	28	384
	(0.000)	(92)	(17)	(59)

Notes: The table examines the heterogeneity in the effects of the tax holiday (TH). It presents the estimated coefficient on an indicator variable which is 1 in the year in which municipal and cantonal taxes are zero due to the tax holiday. In each panel, this dummy variable is interacted with another variable of interest. The baseline effect of these interactions is controlled for but not shown. The dependent variable in column (1) is an indicator whether a person has positive wage income in a given year. The dependent variable in columns (2) and (3) is average wages of males (column 2) and females (column 3) with positive wage income in a given year. The dependent variable in columns (4) is annual self-employment income per person (including 0) in a given year. In Panel A, the dummy blank year is interacted with a dummy that is 1 in case a canton voted about the tax reform associated with the tax holidays. In Panel B, it is interacted with a dummy that is 1 for French-speaking municipalities. In Panel C, the dummy blank year is interacted with the cantonal unemployment rate in 1997 (in percent, normalized to have mean 0). In Panel D, the dummy blank year is interacted with the cantonal share of tax payers that had a betwixt assessment in the tax period 1997/1998 (in percent, normalized to have mean 0). Standard errors are clustered on the level of commuting zones. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$