Alleged Tax Competition: The Mysterious Death of Bequest Taxes in Switzerland *

Marius Brülhart Raphaël Parchet
University of Lausanne†

August 31, 2011

Abstract

Interjurisdictional competition over mobile tax bases is an easily understood mechanism, but actual tax-base elasticities are difficult to estimate. Political pressure for reducing tax rates could therefore be based on erroneous estimates of the mobility of tax bases. We show that tax competition provided the most prominent argument in the policy debates leading to a succession of reforms of bequest taxation by Swiss cantons. Yet, we find only very weak statistical evidence of a relationship between tax burdens on bequests and the concerned tax base of wealthy elderly individuals. Moreover, bequest tax revenues are found to increase in bequest tax rates even in the long run, and we cannot reject the hypothesis that the elasticity of bequest tax revenue with respect to the average bequest tax rate is equal to one. The alleged pressures of tax competition did not seem in reality to exist.

JEL classification: H3, H7
Keywords: tax competition, bequest taxation, fiscal federalism

*We thank the editor (James Hines), two anonymous referees, and seminar participants at the Universities of Lausanne, Barcelona and Paris 1 for helpful suggestions. Hansueli Bacher provided valuable help with the data. Financial suppport from the Swiss National Science foundation (Sinergia grant 130648, NCCR "Trade Regulation", and ProDoc grant 123133) and from the EU's Sixth Framework Programme ("Micro-Dyn" project) is gratefully acknowledged.

†Department of Economics (DEEP), Faculty of Business and Economics, University of Lausanne,1015 Lausanne, Switzerland. marius.brulhart@unil.ch, raphael.parchet@unil.ch. Marius Brülhart is also affiliated to the Center for Economic Policy Research (London).

1 Introduction

Governments, it is often argued, are finding it increasingly difficult to raise revenue, as people and capital are becoming ever more mobile. This would mean that tax bases are becoming more elastic, and that revenue-maximising as well as welfare-maximising tax rates are falling. The logic and relevance of this tax competition mechanism are not in doubt, underpinned as they are by large bodies of theoretical and empirical research.[1]

Existing research does not, however, address a potential corollary of this fiscal phenomenon. While the conceptual logic of tax competition is simple, the practical estimation of tax-base elasticities and optimal tax rates is fraught with uncertainty. When tax competition becomes a dominant theme in policy debates, policy could overshoot by lowering tax rates beyond what would be the optimal response to changing tax-base elasticities. This may be called "alleged tax competition": political pressure for reducing certain tax rates that is based on upward biased estimates of the inter-jurisdictional mobility of the concerned tax bases.[2]

We study the case of bequest taxation in Switzerland, where the relevant tax base is constitutionally assigned to sub-federal governments (cantons). Bequest taxes have been repealed or significantly lowered by a majority of cantons in a domino-like process that began in the early 1990s. In every case, the first and by far the most important argument invoked by the (almost always successful) proponents of reform was tax competition: with wealthy tax payers becoming increasingly footloose, they argued, tax burdens had to be lowered in order to retain the tax base and, possibly, to expand it. In this sense, recent Swiss policy changes mirror a broader trend. Over the last three decades, more than 30 US states have eliminated their bequest taxes - a development which Conway and Rork (2004) considered "a prime example of intense interstate tax competition".[3] The same logic is invoked at the international level. When Hong Kong abolished its estate tax in 2005, the government's official justification was that "a number of countries in the region, including India, Malaysia, New Zealand and Australia, have abolished estate duty over the past 20 years. Hong Kong must not lose out in this race".[4] In 2008, Singapore followed suit, in order to "encourage wealthy individuals from all over Asia to bring their assets into Singapore".[5]

[1] For overviews of the theory, see e.g. Wilson (1999) and Haufler (2001). Empirical evidence on international tax competition is provided e.g. by Griffith and Klemm (2004) and by Hines (2007).

[2] The opposite scenario, whereby taxes are insufficiently responsive to changes in the mobility of tax bases, is of course conceivable as well.

[3] In subsequent work, however, the same authors detected no statistically significant evidence of a link between bequest tax burdens and migration flows of elderly residents (Conway and Rork, 2006, 2011).

[4] www.lowtax.net/lowtax/html/hongkong/jhkpetx.html#estate

[5] www.prlog.org/10051481-singapore-abolished-estate-duty-tax-with-immediate-

Exploring this issue in data for Swiss cantons over the last two decades and using a wide range of regression specifications, we fail to uncover a statistically significant relationship between bequest tax rates and the relevant tax base, wealthy elderly individuals. Conversely, the relationship between bequest tax rates and bequest tax revenues is found to be robustly and statistically significantly positive, with a revenue elasticity close to one. The alleged pressures for tax reforms due to mobile tax bases therefore are not supported by an analysis of the available data.

Our work is related to a number of previous studies. First, several researchers have estimated tax-base elasticities with respect to bequest taxation in the United States. Bakija and Slemrod (2004) find that state bequest taxes have a statistically significant negative effect on the number of federal estate tax returns filed in a state. The estimated effects, however, are economically small, in the sense that they are well below the elasticities that would imply a potential for revenue-rising tax cuts. They estimated associated deadweight losses equivalent to between 3.3 and 7.8 percent of revenue raised. A similar verdict emerges from the work of Conway and Rork (2006, 2011), who find no statistical evidence that bequest taxes (nor indeed any other fiscal measures targeted at the elderly) affect inter-state migration patterns of elderly Americans.

Could it be that the United States are too large, and/or intra-national variation of tax rates too limited, for significant mobility responses to differences in bequest taxation? Data on Switzerland allow us to examine this question in a much smaller country with even greater sub-federal heterogeneity of bequest taxation. Our study differs from these US-based analyses in three additional respects: we relate canton-specific revenue raised by bequest taxation to canton-specific rates of bequest taxation, we have access to data on inter-cantonal migration as well as on local changes in federal income tax revenues, and we can formally document the weight of the tax competition argument in tax-setting policy decisions.

A second related literature seeks to describe and explain the economic and political forces behind the erosion of bequest taxation observed in many countries.[6] Bertocchi (2011) presents evidence of a global trend towards lower bequest tax revenues and offers a theoretical explanation. In her model, industrialisation lowers income inequality and shifts wealth holdings from land towards capital. Both mechanisms favour a fall in bequest tax burdens, because (a), with lower income inequality, the incentive for the median voter to seek redistribution is reduced, and (b) capital is easier to hide from the tax authorities than land. This model presents a plausible

effects.html

[6] Our focus is on research into the economic and political determinants of observed levels of bequest tax burdens and of changes therein rather than on the broader question of the optimal level of bequest taxation. For recent surveys of the latter literature, see Cremer and Pestieau (2006) and Kopczuk (2010).

rationalisation of long-run shifts from bequests to other tax bases, but is unlikely to offer the main explanation for the rapid reductions in bequest tax burdens adopted by a number of developed countries in recent years. Gale and Slemrod (2001) describe the long-run evolution of estate taxation in the United States, and Graez and Shapiro (2005) present an account of the political processes that led to the 2001 repeal of the US federal estate tax, without, however, offering a synthesis of the principal explanatory factors. To our knowledge, a theoretical explanation of the recent global trend towards lower bequest taxes has not yet been attempted.

At the sub-national level, Conway and Rork (2004) have estimated reaction functions among US state-level estate tax rates. They find evidence of correlated changes in tax rates among states that are assumed to compete over elderly taxpayers, where they identify "competing" states based on observed inter-state migration flows of elderly residents. They interpret this as evidence of inter-state tax competition. It is, however, difficult to infer competition over mobile tax bases from tax reaction functions. Spatially correlated tax changes could be a manifestation of other types of policy interactions or of correlated unobservables (see, e.g., Brueckner, 2003). One way of identifying the presence of competition over mobile tax bases is by estimating the mobility of tax bases directly (Brett and Pinkse, 2000; Buettner, 2003; Bakija and Slemrod, 2004; Conway and Rork, 2006, 2011). This will be the central focus of our study, which aims to estimate the effect of changes in estate tax rates on inter-jurisdictional movements of the most directly concerned tax bases as well as on the associated tax revenues.

The paper is structured as follows. In Section 2, we describe bequest taxation and fiscal policy making in Switzerland, we document the erosion of bequest taxes, and we quantify the dominance of the tax competition argument in the associated policy debates. We set out our empirical strategy and data in Section 3. In Section 4, we report our estimates of tax-base and tax-revenue responses to changes in bequest tax rates. We conclude by summarising and discussing our findings in Section 5.

2 Bequest Taxation in Switzerland

2.1 Decentralisation and Reforms

The Swiss political system features a high degree of fiscal decentralization and large differences in tax burdens across sub-federal jurisdictions. This makes Switzerland a well suited empirical testing ground for questions related to tax competition.

Bequest taxation is a case in point. It is constitutionally assigned exclusively to the 26 cantons, and cantonal bequest tax codes differ substantially.[7]

[7]In four cantons (Fribourg, Graubnden, Luzern and Vaud), municipalities can in ad-

Bequest taxes on assets other than real estate are due by the heirs to the canton in which the deceased had his last fiscal residence. Like in most countries, including the United States, the transfer of real estate, representing around one third of the value of bequests, is taxed in the jurisdiction in which the property is located.

25 of the 26 cantons levy bequest taxes (the exception being the canton of Schwyz). In 23 of those 25 cantons, bequest taxes were introduced between 1884 and 1918, the remaining two cantons (Obwalden and Valais) taking that step in 1970. In 22 cantons, bequest taxes are levied on inheritances, such that tax rates vary in two main dimensions: the amount inherited (progressive taxation) and family ties with the deceased (the closer the ties, the lower the tax rate). Three cantons apply estate taxes. In our sample of tax data, which spans the period 1981 to 2008, spouses and direct descendants represent about three quarters of all heirs. The highest marginal tax rate for spouses and direct descendants observed in our data is 9 percent, whereas unrelated heirs have been taxed in some cantons at up to 60 percent.

Of the cantons that have at some point within our sample period levied bequest taxes on direct descendants and/or spouses, the time-averaged tax rate is around five times higher in the highest-tax canton than in the canton with the lowest (non-zero) rate. These differences, however, have narrowed significantly in recent years. A wave of canton-level reforms has been implemented since the late 1980s with the result of markedly lowering bequest tax burdens across the country. Of the 18 cantons that had imposed an inheritance tax on direct descendants and/or spouses in 1981, only three still apply a tax on direct descendants in 2011, and none taxes inheritances by spouses. This is illustrated in Figure 1, which shows the evolution of the average tax rate on an inheritance of CHF 500,000 by a direct descendant, in each of the 26 cantons. Table 1 provides details on the 29 largest reforms, which implied cuts in the average bequest tax rate ranging from 5.4 to 71.2 percent of the starting level. All but one of the 29 reforms brought about lower average tax rates. Revenue raised from bequest taxes represented some 1.4 percent of total sub-federal tax revenue in 2007, down from 2.5 in 1997.[8] Scaled to total private wealth, bequest tax revenue fell from 0.14 percent in 1997 to 0.06 percent in 2007 (see Figure 2). It is this wave of reforms that will provide the main identifying variation for our estimations.

2.2 The Tax Competition Argument

All major reforms to cantonal bequest taxation were preceded by vigorous public debate, and in 16 cases they were passed through referenda. One advantage of the broad based (direct) democratic decision-making proce-

dition levy their own bequest taxes.

[8] For comparison, estate and gift taxes in the US represented 0.6 percent of state and local tax revenue in 2006, down from 1.3 percent in 2000 (US Census Bureau).

dures in Swiss cantons is that they offer us comparable official documents laying out the arguments that dominated political discussions. We have analysed official voting brochures for reforms in 14 cantons, selected to include a maximum number of referenda as well as all reforms that implied a decrease in the average bequest tax rate of more than 25 percent.[9] Summary information on those 14 reforms is given in Table 2.

Official brochures are issued routinely by cantonal governments to accompany public and parliamentary votes, laying out the arguments of the executive. Without exception, these brochures advocated adoption of the reforms. In order to quantify the relative weights of the arguments made, we counted the number of words dedicated to each pro-reform argument, and we recorded their order of appearance.

Results are presented in Figure 3. It is easy to see that tax competition was by far the most prominent argument, both in terms of the space dedicated to it and in terms of the order in which the arguments were made. The tax competition argument appears almost exclusively in first position and accounts for some 52 percent of text space, far ahead of alternative arguments for tax reform, such as the fact that taxing bequests can be considered a form of multiple taxation (18%), that bequest taxes may be viewed as infringing private property rights (9%), or that they might impede the transfer of family-owned firms (7%).

If inter-cantonal mobility of wealthy elderly residents has been presented as the central argument in favour of reducing tax rates, avoidance strategies other than mobility could theoretically also be at play. Gifts, property investments in lower-tax cantons or tax evasion are potential alternative responses to tax differentials.[10] By estimating the effects of bequest tax reforms on federal income-tax revenues from elderly taxpayers as well as on bequest tax revenues themselves, we will be able to assess the fiscal impact of such reforms in the face of other conceivable avoidance strategies.

3 Empirical Strategy

3.1 Tax Rates, Mobile Tax Bases, and Tax Revenue

We seek to assess the validity of the tax-competition rationale by exploring the following two questions:

1. To what extent does the affected tax base react to changes in the bequest tax rate?

[9] For three referenda, Zrich in 1987, Appenzell Ausserrhoden in 1993 and Nidwalden in 1995, we did not have access to official documents.

[10] Gifts *inter vivos* offer only limited shelter from to inheritance taxation, since they are taxed according to the same schedule as bequests.

2. To what extent does bequest tax revenue react to changes in the bequest tax rate?

The two questions are evidently linked. If, after analysing the first question, one were to conclude that the tax base did not react to changes in the tax rate, then the answer to the second question would in some sense be trivial, as the change in tax revenue, *ceteris paribus*, would be proportional to the change in the tax rate. However, since tax base responses are inevitably measured with error, and since there is a conceivable role for alternative avoidance strategies, it may still be useful to validate a finding of zero response via a corresponding finding that tax revenues move with tax rates. Were one to observe some reactivity of the tax base to changes in the tax rate, the second question would become more interesting still.

An extreme version of the tax-competition argument is that tax cuts "pay for themselves", in the sense that the elasticity of the tax base is sufficiently large that, other things equal, tax revenue will be higher with a tax cut than without a tax cut. Since this scenario implies Pareto suboptimal tax rates prior to the cuts, it is not an equilibrium outcome in models featuring rational and well-informed agents. However, our document analysis of government brochures shows that such predictions featured prominently among the arguments made by advocates of bequest tax reforms.

To validate the prediction that bequest tax revenues increase in the bequest tax rate, we would need to find a negative relationship between changes in bequest tax rates and the associated changes in tax revenues - akin to a Laffer effect -, controlling for other covariates and allowing for a sufficiently long adjustment period.

According to a second version of the tax-competition argument, bequest tax revenues themselves may fall with a tax cut but overall tax revenues will rise, as lower bequest taxes attract wealthy individuals who pay taxes also during their lifetime. We can test this prediction by exploring the effect of bequest tax rates on canton-level revenues generated by the federal income tax on retirees or on wealthy retirees. The federal income tax schedule being more progressive than cantonal income tax schedules, this measure will be particularly sensitive to behavioural responses by the members of the upper reaches of the income distribution in the subclass of wealthy retirees.

Tax competition may also lead a jurisdiction to follow suit on other jurisdictions' tax cuts even if this response were not in fact to yield higher revenues, be it from the affected tax base itself or from all tax bases taken together. Two-region Nash equilibria with tax rates as governments' strategic variable imply that tax rates are strategic complements (Wilson, 1991). According to the logic of these models, an exogenously determined tax cut in one region will trigger cuts by the other jurisdictions, even if everybody will end up worse off in terms of revenue. However, if local governments are assumed to optimise over the level of public expenditure rather than over tax

rates, tax rates may well be strategic substitutes (Wildasin, 1991). Koethenbuerger (2011) shows that local jurisdictions have a particular incentive to optimise over expenditure when federal equalisation grants subsidise local tax effort - which was largely the case under the Swiss system up to 2007. Under such a configuration, an exogenously determined tax cut in one region would induce tax raises by the other local governments, striving to maintain their revenue. Hence, if we found that tax revenue on average responds positively to the tax rate, tax competition could still be at play, but it would be impossible to determine whether the observed wave of successive tax reforms represented a series of optimal responses or not.

Nonetheless, short of finding positive revenue effects of tax cuts, there still exists an indirect way of gauging the relevance of tax-induced mobility, and thus of tax competition. In the standard tax competition model, the elasticity of tax revenue with respect to the tax rate is positive, but it is less strongly positive in small jurisdictions than in large jurisdictions (see e.g. Bucovetsky, 1991; Wilson, 1991). If measured differences in revenue elasticities were indeed due to tax-induced mobility, we should therefore observe larger elasticities for small jurisdictions than for large jurisdictions.

3.2 Sensitivity of the Tax Base to the Tax Rate

The basic specification employed for exploring the first research question is as follows:

$$B_{it} = \alpha_{base} T_{it} + \beta'_{base} \mathbf{X}_{base,it} + \gamma_{base,i} + \delta_{base,t} + \varepsilon_{base,it}, \qquad (1)$$

where i denotes regions (i.e. cantons), t denotes periods (i.e. years), B is a measure of the relevant tax base, T is a measure of the average bequest tax rate, $\mathbf{X}$ is a vector of controls, α_{base} is our coefficient of interest, β_{base} is a vector of coefficients, γ_{base} and δ_{base} are fixed effects, and ε_{base} is a stochastic error term.

Tax competition models imply a negative value of α_{base}. A zero value of this parameter would suggest that the tax base is insensitive to the applied tax rate, and a positive value would suggest - implausibly if $\mathbf{X}$ contains all the relevant controls - that the tax base is attracted by higher tax rates.

Specification (1) includes fixed effects for cantons (γ_{base}) and years (δ_{base}). We thereby control for all unobservable time-invariant canton-specific features affecting the tax base, such as central location or attractive landscapes, and for all relevant unobservable canton-invariant year-specific features, such as business cycles or policy changes at the federal level. By including these fixed effects, we force identification of α_{base} to be based on canton-year idiosyncratic changes in the tax rate, thus implying a difference-in-difference empirical strategy.

It is of course impossible to measure B_{it} with complete accuracy. The incidence of bequest taxation is an unknown quantity for taxpayers, as it

depends on the timing of death as well as on the value of bequeathed assets at the time of death. We follow the literature in focusing on elderly and wealthy individuals as the tax base most directly concerned and thus most likely to respond to changes in bequest taxation. We use five alternative measures of the tax base B_{it}:

(A) net in-migration of elderly residents (flow measure, age $\geq$ 65),

(B) the number of wealthy retirees (stock measure, net annual income $\geq$ CHF 120,000, in logs),

(C) federal income tax revenue from retirees (in logs),

(D) federal income tax revenue from wealthy retirees (net annual income $\geq$ CHF 120,000, in logs),

(E) per-capita federal income tax revenue from wealthy retirees (net annual income $\geq$ CHF 120,000, in logs).[11]

Measure (A) has the advantage of capturing inter-cantonal mobility and the drawback that it does not distinguish individuals by income class. Measure (B) avoids this drawback, but, being a stock measure, it captures both migration-induced changes in wealthy elderly residents and changes that are due to demographic factors (and thus unlikely to be influenced by bequest taxes). Measures (C) and (D), while not offering a head count of affected residents, represent more targeted proxies for the relevant tax base. The federal tax code applies identically across cantons, it is strongly progressive (as are bequest taxes, where they exist), and revenue statistics are broken down by canton, income bracket and labour-market status. Tax revenue moreover reflects the outcome of the full range of tax planning strategies and not only of residential choices. For measure (E), federal income tax revenue from high-income retirees is divided by the number of retired taxpayers in the relevant income class. We thereby "zoom in" on the presumably most directly affected segment of the tax base, very wealthy retirees (in the sense that their wealth significantly exceeds the cut-off level used for the definition of a "wealthy" individual). Hence, measure (E) captures compositional changes within the subclass of wealthy retirees.

3.3 Sensitivity of Bequest Tax Revenue to the Tax Rate

Our second research question addresses the relationship between bequest tax rates and the associated tax revenue.

[11] Over our sample period the average exchange rate was 1.60 Swiss francs (CHF) to the U.S. dollar. Precise variable definitions are given in Section 3.5.

The basic specification employed for exploring this research question is a second-degree polynomial in the tax rate:

$$R_{it} = \alpha_{1,rev} T_{it} + \alpha_{2,rev} T_{it}^2 + \beta'_{rev} \mathbf{X}_{rev,it} + \gamma_{rev,i} + \delta_{rev,t} + \varepsilon_{rev,it}, \quad (2)$$

where R_{it} measures log tax income from bequests in canton i and year t, and the remaining symbols mirror those of equation (1). By adding a square term of the tax rate we allow for a possibly non-monotonic relationship between tax rates and tax revenues, and we thereby leave open the possibility that the revenue-maximising tax rate, given by $-\alpha_{1,rev}/2\alpha_{2,rev}$, lies within the feasible interval for T_{it}. If we found that relationship to be negative over some of the feasible interval, this would imply that, on average, tax cuts increased revenue. If we were to find that tax cuts reduced revenue but that the interaction between T_{it} and a measure of jurisdiction size is significantly positive - implying that small jurisdictions lose less revenue by lowering their tax rate than large jurisdictions -, this would provide indirect evidence that tax-base mobility played a role.

3.4 Estimation Issues

Estimation of equations (1) and (2) faces a number of econometric challenges. The three central issues concern reverse causality, timing, and inference.

The potential for *reverse causality* is simple to grasp. We seek to identify the effect of changes in tax rates on the size of the relevant tax base and on tax revenue, but causation could run in both directions. For instance, an inflow of wealthy elderly residents could strengthen political opposition to bequest taxation; or a period of buoyant bequest tax revenues might lead local governments to conclude that they can reduce tax rates without having to reduce expenditure below the desired level. To solve this problem, we ideally would find an instrument for changes in cantonal bequest tax schedules, but no convincingly exogenous variable that is related to changes in local bequest tax schedules is available.[12] Yet, we argue that reverse causality is in fact unlikely to pose a serious problem for our research. Our difference-in-difference specifications remove a major part of potential sources of endogeneity. Take the tax-base equation (1) with the net inflow of elderly residents as the dependent variable (measure A). The maximum absolute share of net elderly in-migration in total population equals 0.16 percent,

[12] One strategy we tried was to take advantage of the "domino-like" inheritance tax reforms in Switzerland and to use as instruments (past) average inheritance tax rates in neighbouring cantons. Results behave as expected with coefficient estimates closer to zero, but the instruments turn out to be weak. Another approach is to use "internal" instruments from suitably transformed dependent variable in dynamic panel GMM estimation. We have applied these methods but found them to provide results that are unstable and sensitive to small specification differences. Results are available on request.

and the mean share is 0.02 percent. It would seem far fetched to assume that one year's inflow of residents of such magnitude would systematically affect bequest tax setting in that or the subsequent year. The politically relevant migration flows are even smaller than those we can measure, as they would comprise only Swiss nationals. Similarly, if we take changes in the stock of elderly residents (measure B), we find that the maximum net change corresponds to 3.19 percent of the relevant canton population, with a mean of 0.19 percent - again hardly sufficient magnitudes for a significant and systematic effect on cantonal tax setting. Moreover, it is important to note that reverse causality, if it nonetheless were present, would bias our estimated α_{base} away from zero. If, as will be the case in most estimation runs, we find coefficients that are not statistically significantly different from zero, this result can in fact be considered all the stronger for the potential (albeit unlikely) presence of reverse causality.

There are many conceivable ways of modelling the *timing* of the effects we seek to uncover. Our baseline specifications (1) and (2) take the simplest approach, by focusing on contemporaneous impacts of changes in tax rates. This will not capture the full effects if migration patterns and tax revenues react sluggishly to changes in tax rates. That is why we also estimate autoregressive versions of our baseline equations, using second-order autoregressive distributed lag (ADL(2,2)) variants of our two empirical models:[13]

$$\begin{aligned} B_{it} =& \lambda_{baseADL,t-1} B_{it-1} + \lambda_{baseADL,t-2} B_{it-2} + \alpha_{baseADL,t} T_{it} + \\ & \alpha_{baseADL,t-1} T_{it-1} + \alpha_{baseADL,t-2} T_{it-2} + \beta'_{baseADL} \mathbf{X}_{baseADL,it} \\ & + \gamma_{baseADL,i} + \delta_{baseADL,t} + \varepsilon_{base,it}, \end{aligned} \tag{3}$$

$$\begin{aligned} R_{it} =& \lambda_{revADL,t-1} R_{it-1} + \lambda_{revADL,t-2} R_{it-2} + \alpha_{1revADL,t} T_{it} + \\ & \alpha_{1revADL,t-1} T_{it-1} + \alpha_{1revADL,t-2} T_{it-2} + \alpha_{2revADL,t} T_{it}^2 + \\ & \alpha_{2revADL,t-1} T_{it-1}^2 + \alpha_{2revADL,t-2} T_{it-2}^2 + \beta'_{revADL} \mathbf{X}_{revADL,it} \\ & + \gamma_{revADL,i} + \delta_{revADL,t} + \varepsilon_{revADL,it}. \end{aligned} \tag{4}$$

The ADL(2,2) model nests the most widely used dynamic processes. For example, it can represent a "common factor" model with contemporaneous measured effects and autocorrelated errors. This would imply that $\alpha_{...ADL,t-1} = -\alpha_{...ADL,t}\lambda_{...ADL,t-1}$ and $\alpha_{...ADL,t-2} = -\alpha_{...ADL,t}\lambda_{...ADL,t-2}$. According to this model, the impact of changes in tax burdens on the tax base B_{it} and/or on tax revenue R_{it} fully materialises within year t, but

[13] The first-order autoregressive distributed lag (ADL(1,1)) variants give similar results. We use a longer lag structure in order to increase our chances of capturing any delayed responses.

there are persistent shocks to the stochastic component of the dependent variable. In addition, (3) and (4) also nest the ADL(2,0) model, implying that $\alpha_{...ADL,t-1} = \alpha_{...ADL,t-2} = 0$. The ADL(2,0) specification in turn can be derived from a number of theoretical bases, the most relevant of which is the "partial adjustment" model. In that model, the dependent variable responds sluggishly to changes in the explanatory variables, with geometrically declining lag weights. In our context, this represents delayed responses by tax bases and/or revenues to changes in tax rates, for example because migration decisions take time or because information disseminates slowly.[14] In a dynamic setting within a short panel, the fixed-effects OLS estimator is not consistent (Nickell, 1981). We therefore estimate our dynamic specifications using the bias-corrected panel estimator suggested by Bruno (2005).

Finally, *inference* needs to take account of the panel structure of our data. Errors could be correlated over time within cantons despite the inclusion of canton-specific fixed effects γ_i. Regression errors may in addition be (spatially) correlated across canton within given years. With the estimates of equations (1) and (2), we therefore report standard errors that are clustered by canton and by year, following Cameron, Gelbach and Miller (2010). For equations (3) and (4), we report parametrically bootstrapped standard errors following Bruno (2005).

3.5 Data

Data on inter-jurisdictional migration (measure A) are available from the Swiss Federal Statistical Office. They consist of annual migration flows (in-migration, out-migration and net in-migration) decomposed by age group for the 26 cantons between 1981 and 2005. The stock measures (B) to (E) are taken from federal income tax statistics, which are broken down by occupational status (retired, employed, self-employed), income class and canton. Data on retired taxpayers are available for 1987-2005.[15]

Our main measure of the relevant tax rate, T_{it}, is designed to quantify a representative bequest tax burden. We construct the Average Inheritance Tax Rate (AITR) as a weighted average - across different bequest size classes and categories of heirs - of average effective inheritance tax rates. Weights are defined by the frequency of observed bequests in each class, using data for the canton of Vaud (see Appendix).[16]

[14] For an exposition of common factor and partial adjustment models, see e.g. Davidson and MacKinnon (2004, ch. 7 and 13).

[15] The tax system changed during our sample period from a biannual to an annual basis, and the timing of this change differed across cantons. Our strategy in this respect is to apply three-year moving averages for the biannual observations (see Table 3).

[16] As an alternative to this measure, we have estimated all our models using the maximum statutory tax rate recorded in federal statistics, i.e. the average effective tax rate on an inheritance of CHF 500,000 by a direct descendant. Our estimates of tax-base elas-

In addition to canton and year fixed effects, we aim to control for all other potentially relevant factors that vary by canton and year and that could plausibly affect migration decisions. We thus include measures of the average tax burden on wealth and on income (specific to the tax base considered) as well as the corresponding tax burden of adjacent cantons, computed as unweighted averages of the tax burdens of contiguous neighbour cantons. Furthermore, we include a range of controls that could conceivably affect location choices of wealthy elderly residents: the proportion of parliamentary seats held by left-of-centre representatives in cantonal parliaments; public expenditure on culture, police, health care, and other public expenditure; pension support for low-income retirees; real estate prices; the crime rate; the proportion of poor taxpayers; the share of foreign residents and the canton-level unemployment rate.[17]

4 Results

4.1 Bequest Tax Rates and Tax Bases

Table 4 exhibits estimates of the responsiveness to bequest tax rates (AITR) of our five alternative measures of the tax base, estimated using equation (1). In the upper panel of the table, we report estimates from regressions that exclude all controls, thus assuming that $\beta'_{base} = \mathbf{0}$, whereas the full set of controls is included to generate the results given in the lower panel of Table 4. For each specification, we furthermore show a version without and with controlling for the AITR of adjacent cantons.

In line with expectations, the tax effects are estimated to be negative in 17 of the 20 specifications. However, these results are statistically significant in only three instances. Statistically significant estimates are found only when we take per-capita federal income tax revenue from wealthy retirees (measure E) as the dependent variable. This suggests that changes in bequest tax burdens have no statistically significant effect on the corresponding tax base except for the class of the very wealthiest retirees. Since measure E captures the composition of the class of wealthy retirees, the positive coefficients obtained for that measure imply a thickening of the upper tail of the income distribution within that class. These apparent distribution effects, however, are not strong enough to allow us to reject the hypothesis

ticities turned out not to be qualitatively affected by this choice. Results are available on request.

[17] Some control variables may in fact be "bad controls" if there exists a causal link from our variable of interest to those variables. This would seem a particular concern with regard to the public expenditure variables, which are measured as of the 31st of December of each year, whereas inheritance tax rates are recorded at the beginning of the year. Our strategy in this respect is to include these variables with a one-year lag. We also report results without including any controls except for the fixed effects.

that changes in bequest tax rates had no effect on the size of the overall tax base of the relevant cantons (measures C and D).

Estimated cross-canton effects are consistent with those on own-canton effects: partial correlations between neighbours' AITR and own tax bases are positive throughout but (borderline) statistically significant only for measure E as the dependent variable.

Table 5, which is organised analogously to Table 4, shows estimates for our five measures of the tax base in the ADL(2,2) specification. Implied long-run coefficients are computed from the steady-state long-run equilibrium version of equation (3) as $(\alpha_{baseADL,t} + \alpha_{baseADL,t-1} + \alpha_{baseADL,t-2})/(1 - \lambda_{baseADL,t-1} - \lambda_{baseADL,t-2})$. They are reported together with their associated statistical significance levels at the bottom of each panel. These results are even weaker than those found for the static specifications, as we find no statistically significant long-term effects of own or neighbour-canton bequest taxes. In 6 out of the 20 estimation runs, the estimated long-run own-effect of bequest taxes even turns positive.

These results remain unchanged for all alternative specifications we explored. In particular, we have experimented with measures of the tax base as differences from a pseudo-control group (young net in-migration for our measure A, and retired taxpayers with net annual income between CHF 30,000 and 50,000 for measures B to E). This, in conjunction with canton and time fixed effects, should control for unobserved determinants of migration that affect all age and/or wealth classes that could bias our estimations. The same findings emerged with these definitions for our baseline regressions as well as for our autoregressive specifications, thus confirming the essential absence of a discernible reaction of tax bases to changes in bequest tax rates.[18]

Our findings on the impact of changes in bequest tax burdens on the relevant tax bases are easily summarised: we detect no statistically significant effect of bequest tax rates on elderly migration and on the tax base measured through federal income tax receipts. We are able to detect some statistical evidence of thickening of the upper tail of the income distribution among the class of wealthy retirees, but this effect is not strong enough to allow us to identify an effect on the size of the affected tax base (measured through federal income tax receipts) taken as a whole.

4.2 Bequest Tax Rates and Bequest Tax Revenues

Table 6 presents estimates of the responsiveness of bequest tax revenue with respect to the bequest tax rate. We allow for potentially non-monotonic revenue effects of local bequest taxation by considering second-order poly-

[18] Results are available on request. These findings too are robust to inclusion or exclusion of control variables as well as to different specifications of the functional form (in particular log-log or level-level specifications).

nomials of the variable measuring the tax burden. All variables are in logs, so the regression coefficients can be interpreted as elasticities. At the bottom of the table, we report the implied extrema, together with the maximum tax rate observed in the sample.

For cantonal tax cuts to have been revenue raising, we would need to see a negative long-run elasticity. In contrast, Table 6 shows that the effect of the tax burden on bequest tax revenues is positive both in the baseline and in the autoregressive variants of our empirical model. All our estimation runs in fact imply convex revenue curves, although linearity cannot be rejected.

Our results thus reject the idea of own-revenue-raising tax cuts. However, we might still find indirect evidence of the mechanism underlying tax competition: if the mobility of tax bases were a factor in shaping the measured responsiveness of bequest tax revenues, then models of asymmetric tax competition lead us to expect the revenue-lowering effect of reductions in tax rates to be larger in large cantons than in small cantons. Coefficients on interaction terms between the AITR and canton populations, reported in the second and fourth columns of Table 6, are unexpectedly negative although not statistically significant. This indirect test, therefore, also fails to support the hypothesis that tax-base mobility plays a significant role in determining bequest tax revenues of Swiss cantons.

Finally, Figure 4 illustrates the long-term effect of bequest tax reforms on bequest tax revenue for the sample of cantons that have experienced tax cuts corresponding to a decrease of more than 40% in the AITR. We plot residuals from a regression of log bequest tax revenue on canton and year fixed effects against the number of years prior and subsequent to the year of the reform. The graph suggests quite starkly, and in line with our previous findings, that cutting bequest tax rates implied commensurate reductions bequest tax revenues, even up to 18 years subsequent to those reforms.

5 Concluding Discussion

We show that, in official political debates, tax competition provided the principal argument motivating a recent wave of cuts in bequest tax burdens across Swiss cantons. However, we find these cuts to have had no discernible impact on migration patterns of elderly taxpayers overall nor on the tax base represented by these individuals in terms of federal income taxes. We find some evidence of cuts in bequest taxes thickening the upper tail of the income distribution among wealthy retirees, but these compositional changes are not important enough to translate into statistically significant effects on the overall size of the affected tax base. These results are consistent with existing research on the mobility effects of estate taxes, where despite evidence of statistically significant migration effects for the wealthiest elderly by Bakija and Slemrod (2004), no significant effects are found for elderly migration

overall (Conway and Rork, 2006, 2011).

Expressed simply, the forces of tax competition invoked so prominently by Swiss sub-national governments were not strong enough - if they existed at all - to manifest themselves in the most disaggregated available data. Yet, there are nevertheless reasons why one might consider successive cantonal bequest tax reforms to have been optimal responses to changed economic circumstances.

One possible explanation could be that the wave of reforms represented a common but unequally timed response to a general increase the mobility of the relevant tax base. Mirrlees (1982), for instance, has shown that the optimal average rate of redistributive income taxation is positively related to the costs of emigration. This mechanism, however, appears to be an unlikely explanation for the erosion of bequest taxes across Swiss cantons. Figure 5 shows that migration rates of elderly tax payers were remarkably stable over our sample period. This mirrors recent evidence for the United States, for which Wolf and Longino (2005) report essentially unchanged interstate mobility of the elderly over the period 1948-2003. It is noteworthy also that none of the official referendum brochures invoked increased mobility of the tax base as an argument for lowering bequest taxes.

Alternatively, avoidance strategies other than inter-cantonal mobility could have implied large excess burdens and therefore provided a rationale for tax cuts. We have found no statistically significant responses in terms of federal income tax bases, which suggests an absence of behavioural responses also in dimensions other than migration.

Our estimates of the elasticity of own-tax revenue can shed additional light on this. Absent any behavioural responses, this elasticity would be equal to one. Indeed we find that our estimated long-run elasticities are not statistically significantly different from unity (see bottom row of Table 6). Hence, we cannot reject the hypothesis that the excess burden of bequest taxation was zero. This is all the more remarkable for the fact that these estimations may well suffer from attenuation bias, as AITR is a proxy variable for the relevant tax rate and therefore carries some inevitable measurement error. If we nonetheless take the point estimates of long-run elasticities at face value, we observe that they range from 0.81 to 0.97. This elasticity provides a local approximation of the percentage revenue loss due to behavioural responses, which in turn can be used to compute the deadweight loss per unit of revenue raised.[19] Our estimated deadweight loss thus amounts to between 1.5 percent and 11.7 percent of bequest tax revenue. This implied magnitude of efficiency costs is somewhat wider than the excess burdens computed for the US by Bakija and Slemrod (2004), whose

[19] If ε is the estimated elasticity of bequest tax revenue relative to the AITR, the deadweight loss is computed as $\frac{1-\varepsilon}{2\varepsilon}$ (see, Bakija and Slemrod, 2004; and Saez, Slemrod and Giertz, 2011).

comparable estimates ranged from 3.3 to 7.8 percent, but the mid-points of the two intervals are similar. Whilst we need to treat our efficiency costs estimates with considerable caution, they suggest that local deadweight losses associated with bequest taxes in Switzerland are of comparable magnitude to those found in the United States.

Despite the rich panel variation in local bequest tax rates offered by our data set, our estimations fail to uncover evidence of statistically significant behavioural responses. Nonetheless, our test could lack power. We are constrained to work with canton-aggregate data, which may not be fine-grained enough to allow us to detect tax-induced avoidance strategies in their entirety.[20] Moreover, aggregation across heir classes could mask heterogeneous revenue elasticities, whereby tax cuts could have positive revenue effects for some bequest types but not for others. It would therefore be very useful for this work to be validated with individual-level data.[21]

The possibility of type II and aggregation errors notwithstanding, our results are suggestive of inelastic bequest tax bases. We are thus still left with the question of what were the true drivers of recent changes in bequest taxation in Switzerland and elsewhere. Did policy makers simply overestimate the elasticity of their tax bases? Was tax competition invoked misleadingly to cover for other political motivations? Or are there significant economic effects from bequest-tax reform other than the effects on tax revenue? The case of the disappearing bequest tax remains unsolved.

[20] Behavioural responses in the form of evasion or reduced saving are conceivable but rather implausible explanation given the tight legal controls over estate transfers and the generally low average tax burdens even prior to the wave of reforms. One potential explanation could relate to endogenous discretionary valuations by tax authorities, whereby illiquid assets are valued more leniently when applicable tax rates are high. If so, the behavioural response would occur on the side of tax authorities rather than on the side of tax payers.

[21] This would require that individual-level tax data be made accessible to researchers by the Swiss Federal Tax Administration.

References

[1] Bakija, Jon and Joel Slemrod (2004) Do the Rich Flee from High State Taxes? Evidence from Federal Estate Tax Returns. *NBER Working Paper* #10645.

[2] Bertocchi, Graziella (2011) The Vanishing Bequest Tax: The Comparative Evolution of Bequest Taxation in Historical Perspective. *Economics & Politics*, 23(1): 107-131.

[3] Brett, Craig and Joris Pinkse (2000) The Determinants of Municipal Tax Rates in British Columbia. *Canadian Journal of Economics*, 33(3): 695-714.

[4] Brueckner, Jan K. (2003) Strategic Interaction among Governments: An Overview of Empirical Studies. *International Regional Science Review*, 26(2): 175-188.

[5] Bruno, Giovanni S.F. (2005) Approximating the Bias of LSDV Estimator for Dynamic Unbalanced Panel Data Models. *Economics Letters*, 87(3): 361-366.

[6] Bucovetsky, Sam (1991) Asymmetric Tax Competition. *Journal of Urban Economics*, 30(2): 167-181.

[7] Buettner, Thiess (2003) Tax Base Effects and Fiscal Externalities of Local Capital Taxation: Evidence from a Panel of German Jurisdictions. *Journal of Urban Economics*, 54(1): 110-128.

[8] Buettner, Thiess, Wolfram Scheffler and Christoph Spengel (2004) Erbschaftsteuerbelastung in Deutschland, den Staaten der EU und anderen wichtigen Staaten bei unbeschränkter und beschränkter Steuerpflicht, *ZEW*.

[9] Cameron, Colin A., Jonah B. Gelbach and Douglas L. Miller (2010) Robust Inference with Multi-Way Clustering. *Journal of Business and Economic Statistics*, forthcoming.

[10] Conway, Karen S. and Jonathan C. Rork (2004) Diagnosis Murder: The Death of State Death Taxes. *Economic Inquiry*, 42(4): 537-559.

[11] Conway, Karen S. and Jonathan C. Rork (2006) State "Death" Taxes and Elderly Migration: The Chicken or the Egg? *National Tax Journal*, 59(1): 97-128.

[12] Conway, Karen S. and Jonathan C. Rork (2011) No Country for Old Men (or Women): Do State Tax Policies Drive away the Elderly? *Mimeo*, University of New Hampshire and Georgia State University.

[13] Cremer, Helmuth and Pierre Pestieau (2006) Wealth Transfer Taxation: a Survey of the Theoretical Literature. In: Kolm, S. and J. M. Ythier (eds) *Handbook on the Economics of Giving, Reciprocity and Altruism.* Volume 2, Elsevier.

[14] Davidson, Russell and James G. MacKinnon (2004) *Econometric Theory and Methods.* Oxford University Press.

[15] Gale, William G. and Joel Slemrod (2001) Overview. In: Gale, W.G; J.R. Hines and J. Slemrod (eds) *Rethinking Estate and Gift Taxation.* Brookings Institution.

[16] Graez, Michael J. and Ian Shapiro (2005) *Death by a Thousand Cuts: The Fight Over Taxing Inherited Wealth.* Princeton University Press.

[17] Griffith, Rachel and Alexander Klemm (2004) What Has Been the Tax Competition Experience of the Last 20 Years? *Tax Notes International*, 34(13): 1299-1314.

[18] Haufler, Andreas (2001) *Taxation in a Global Economy.* Cambridge University Press.

[19] Hindersmann, Magnus and Michael Myssen (2003) *Die Erbschafts- und Schenkungssteuern der Schweizer Kantone.* O. Schmidt

[20] Hines, James R. (2007) Corporate Taxation and International Competition. In: Auerbach, A.J., J.R. Hines and J. Slemrod (eds) *Taxing Corporate Income in the 21st Century.* Cambridge University Press.

[21] Kleiber, Christian and Samuel Kotz (2003) *Statistical Size Distributions in Economics and Actuarial Sciences.* Wiley.

[22] Koethenbuerger, Marko (2011) How Do Local Governments Decide on Public Policy in Fiscal Federalism? Tax Vs. Expenditure Optimization. *Journal of Public Economics*, forthcoming.

[23] Kopczuk, Wojciech (2010) Economics of Estate Taxation: A Brief Review of Theory and Evidence. *NBER Working Paper* #15741.

[24] Mirrlees, James A. (1982) Migration and Optimal Income Taxes. *Journal of Public Economics*, 18(3): 319-341.

[25] Nickell, Stephen J. (1981) Biases in Dynamic Models with Fixed Effects. *Econometrica*, 49(6): 1417-1426.

[26] Saez, Emmanuel, Joel Slemrod and Seth H. Giertz (2011) The Elasticity of Taxable Income with Respect to Marginal Tax Rates: A Critical Review. *Journal of Economic Literature*, forthcoming.

[27] Singh, S. K. and G.S. Maddala (1976) A Function for Size Distribution of Incomes. *Econometrica*, 44(5): 963–970.

[28] Slemrod, Joel (1998) Methodological Issues in Measuring and Interpreting Taxable Income Elasticities. *National Tax Journal*, 54(4): 773-788.

[29] Stutz, Heidi, Tobias Bauer and Susanne Schmugge (2007) *Erben in der Schweiz. Eine Familiensache mit volkswirtschaftlichen Folgen.* Verlag Ruegger.

[30] Wildasin, David E. (1991) Some Rudimentary 'Duopolity' Theory. *Regional Science and Urban Economics*, 21(3): 393-421.

[31] Wilson, John D. (1991) Tax Competition with Interregional Differences in Factor Endowments. *Regional Science and Urban Economics*, 21(3): 423-451.

[32] Wilson, John D. (1999) Theories of Tax Competition. *National Tax Journal*, 52(2): 269-304.

[33] Wolf, Douglas A. and Charles F. Longino (2005) Our 'Increasingly Mobile Society'? The Curious Persistence of a False Belief. *The Gerontologist*, 45, 5-11.

Table 1: Major bequest tax reforms

Canton		Year	Change	Main object of reform	Procedure	Decision date	Entry into force	AITR	
								1981	2008
Cantons with major reforms									
Aargau	(AG)	2001	-7.9%	Repeal tax on direct descendants	Referendum	18.04.1999	01.01.2001	2.79	2.38
Appenzell Ausserrhoden	(AR)	1993	-6.5%	Repeal tax on spouses	Referendum[1]	26.04.1992	01.01.1993	3.38	5.31
		1999	-21.9%	Repeal tax on direct descendants	Parliamentary vote	27.09.1998	01.01.1999		
		2001	**+61.5%**	Change tax rate	Parliamentary vote	21.05.2000	01.01.2001		
Basel-Landschaft	(BL)	2001	**-27.1%**	Repeal tax on direct descendants	Referendum	04.03.2001	05.03.2001	4.05	3.37
Basel-Stadt	(BS)	1990	-13.9%	Repeal tax on spouses	Parliamentary vote	16.03.1989	01.01.1990	5.01	2.76
		2003	**-32.3%**	Repeal tax on direct descendants	Referendum	09.02.2003	10.02.2003		
Bern	(BE)	1989	-17.1%	Repeal tax on spouses	Parliamentary vote	01.09.1988	01.01.1989	3.95	1.57
		2001	**-46.6%**	Change tax rate	Parliamentary vote	23.11.1999	01.01.2001		
		2006	-5.4%	Repeal tax on direct descendants	Parliamentary vote	23.11.2004	01.01.2006		
Fribourg	(FR)	1997	-7.1%	Repeal tax on spouses	Parliamentary vote	01.05.1996	01.01.1997	5.73	3.40
Geneva	(GE)	2004	**-27.4%**	Repeal tax on direct descendants and spouses	Referendum	08.02.2004	01.06.2004	7.96	5.98
Glarus	(GL)	2001	**-68.7%**	Repeal tax on direct descendants	Referendum[1]	07.05.2000	01.01.2001	4.22	1.35
Graubünden[2]	(GR)	2001	-13.2%	Repeal tax on spouses	Referendum	13.06.1999	01.01.2001	5.45	3.56
		2008	-8.8%	Repeal tax on direct descendants	Parliamentary vote	08.08.2006	01.01.2008		
Jura	(JU)	2007	-19.8%	Repeal tax on direct descendants and spouses	Parliamentary vote	13.12.2006	01.01.2007	3.95	3.38
Neuchâtel	(NE)	2003	-9.6%	Repeal tax on spouses	Parliamentary vote	21.05.2002	01.01.2003	6.46	5.92
Nidwalden	(NW)	1995	-15.8%	Repeal tax on direct descendants and spouses	Referendum[1]	24.04.1994	01.01.1995	2.23	0.73
		2007	**-61.8%**	Change tax rate	Referendum	21.05.2006	01.01.2007		
Schaffhausen	(SH)	1992	**-71.2%**	Repeal tax on direct descendants	Referendum	15.12.1991	16.12.1991	4.75	1.77
St. Gallen	(SG)	1991	-6.4 %	Repeal tax on spouses	Parliamentary vote	09.05.1990	01.01.1991	3.89	4.06
		1997	-22.4%	Repeal tax on direct descendants	Referendum	08.06.1997	09.06.1997		
Thurgau	(TG)	1990	**-48.8%**	Repeal tax on spouses	Referendum	24.09.1989	01.01.1990	4.03	1.86
		2001	-20.1%	Repeal tax on direct descendants	Parliamentary vote	24.05.2000	01.01.2001		
Ticino	(TI)	1995	-11.9%	Repeal tax on spouses	Parliamentary vote	21.06.1994	01.01.1995	4.87	2.64

Continued on next page...

... Table 1 continued

Canton		Year	Change	Main object of reform	Procedure	Decision date	Entry into force	AITR	
								1981	2008
		2000	**-44.1%**	Repeal tax on direct descendants	Referendum	06.02.2000	01.01.2000		
Vaud	(VD)	2005	-11.0%	Repeal tax on spouses	Referendum	16.05.2004	01.01.2005	6.59	5.83
Zürich	(ZH)	1987	**-33.5%**	Change tax rate	Referendum	28.09.1986	28.09.1986	3.78	2.31
		2000	-19.8%	Repeal tax on direct descendants	Referendum	28.11.1999	01.01.2000		
Cantons with no major reforms									
Appenzell Innerrhoden	(AI)							1.87	2.41
Luzern	(LU)							3.97	3.50
Obwalden	(OW)							2.03	2.03
Schwyz	(SZ)							0.00	0.00
Solothurn	(SO)							3.32	3.57
Uri	(UR)							2.75	2.30
Valais	(VS)							3.25	3.25
Zug	(ZG)							1.80	1.48

Notes: Major reforms include legislative acts at the cantonal level repealing inheritance tax on direct descendants and/or spouses, as well as reforms implying a larger than 25% change (in bold) in the AITR. AITR is our measure of the average inheritance tax rate (see Appendix).

[1]Citizen assembly. [2]The canton of Graubünden levies an estate tax.

Table 2: Documents used for the analysis of political arguments in favour of bequest tax reforms

Canton[1]	Change[2]	Type of reform	Publication	Date
TG	-48.8%	Referendum	Abstimmungsbotschaft Thurgauische Volksabstimmung	24.09.1989
SH	-71.2%	Referendum	Offizielles Schaffhauser Abstimmungs-Magazin	15.12.1991
SG	-22.4%	Referendum	Abstimmungsbrochüre	08.06.1997
BE	-46.6%	Law change adopted by cantonal parliament	Rapport présenté par le Conseil-Exécutif au Grand Conseil relatif à la loi concernant l'impôt sur les successions et donations (LISD)	02.12.1998
AG	-7.9%	Referendum	Erläuterungen zu den Vorlagen zur aargauischen Volksabstimmung	18.04.1999
GR	-13.2%	Referendum	Erläuterungen des Grossen Rates	13.06.1999
ZH	-19.8%	Referendum	Wir stimmen ab. Offizielle Informationen des Regierungsrates[3]	28.11.1999
TI	-44.1%	Referendum	Opuscolo informativo votazione cantonale	06.02.2000
GL	-68.7%	Referendum	Memorial Landsgemeinde 2000. Traktandum 8[4]	07.05.2000
BL	-27.1%	Referendum	Broschüre zur Abstimmung[5]	04.03.2001
BS	-32.3%	Referendum	Abstimmungerläuterungen[6]	09.02.2003
GE	-27.4%	Referendum	Votation cantonale. Brochure explicative[7]	08.02.2004
VD	-11.0%	Referendum	Brochure explicative	16.05.2004
NW	-61.8%	Referendum	Abstimmungsbotschaft Teilrevision des Steuergesetzes[8]	21.05.2006

[1] For full canton names, see Table 1.
[2] Change in percentage points of the AITR. AITR is our measure of the average inheritance tax rate (see Appendix).
[3] http://www.amtsblatt.zh.ch.
[4] http://www.landsgemeinde.gl.ch/2000/pdf/memorial.pdf.
[5] http://www.baselland.ch/erl_erbschaft-htm.291772.0.html.
[6] http://www.regierungsrat.bs.ch/staatskanzlei/wahlen-abstimmungen-archiv.htm.
[7] http://www.ge.ch/votations/20040208/doc/20040208.pdf.
[8] http://www.nw.ch/de/onlinemain/publikationen/.

Table 3: List of variables and summary statistics

Dependent variables	**Mean**	**(Std. Dev.)**	**Min.**	**Max.**	**N**
Migration of people over 65[1]					
In-migration	252.13	(196.95)	10	853	650
Out-migration	304.76	(327.89)	10	1,689	650
Net In-migration (**Measure A**)	-52.63	(184.31)	-1,020	229	650
Number of retired taxpayers with net annual income (1987-2005)[2]					
... over CHF 120,000 (**Measure B**)	985.80	(1,570.74)	4	10,277	494
... total	25,418.65	(28,019.88)	1,036	137,501	494
Tax revenue (in CHF 1,000) from the federal income tax paid by retired taxpayers with net annual income (1987-2005)[2]					
... over CHF 120,000 (**Measures D & E**)	17,739.24	(27,450.57)	96	185,756	494
... total (**Measure C**)	30,447.32	(42,693.37)	386	266,465	494
Tax revenue (in CHF 1,000) from inheritance tax (1981-2008)[1]					
... at canton & municipality level	34,725.11	(59,452.11)	0	529,918	728
Independent variables	**Mean**	**(Std. Dev.)**	**Min.**	**Max.**	**N**
Average Inheritance Tax Rate (AITR)[3]	3.64	(1.82)	0.00	8.23	728
Average Inheritance Tax Rate (AITR) on inheritance of CHF 500,000 received by direct descendants	2.17	(2.25)	0.00	7.10	728
Average tax rate on... (1983-2005)[4]					
... wealth (index)	115.84	(57.17)	39.40	484.20	598
... retired taxpayer (income) (index)	108.14	(43.44)	33.40	317.80	598
... retired taxpayer with net annual income of CHF 150,000 (%)	15.34	(3.76)	6.84	25.08	598
Per capita public expenditure on...[5]					
... culture	358.09	(216.44)	38.90	1,419.80	650
... police	367.68	(152.17)	131.60	872.80	650
... health care	1,586.23	(839.92)	341.60	5,362.90	650
... total	9,927.71	(3,405.21)	4,367.40	21,419.50	650
Pension support for low-income retirees (in CHF 1,000 per beneficiary) (canton)[6]	7.89	(2.99)	2.10	15.69	650
Property price index (1985-2005) (100=1985)[7]	123.18	(13.71)	96.20	160.94	546
Crime rate (per 1,000 inhabitants) (1984-2005)[8]	1.30	(0.59)	0.14	3.82	572
Population (in 100,000)[1]	2.67	(2.78)	0.12	13.07	702
Share of foreign population[1]	0.16	(0.07)	0.05	0.38	650
Share of low-income taxpayers (1987-2005)[2]	0.19	(0.07)	0.08	0.43	494
Unemployment rate (1983-2005)[9]	2.19	(1.79)	0.05	7.81	598
Share of seats held by left-of-centre representatives in cantonal parliaments[10]	0.22	(0.13)	0.00	0.51	646

[1]Source: Swiss Federal Statistical Office. [2]Source: Swiss Federal Tax Administration. Statistics for the fiscal years 1987/1988, 1989/1990, 1991/1992, 1993/1994, 1995/1996, 1997/1998, 1999/2000, 2001, 2002, 2003, 2004, 2005. When fiscal years span two years, data for each year are interpolated by a 3-year moving average. No data for TI, VD, VS in 2001 and 2002. These data are also interpolated by a 3-year moving average. Observations for VD in 2005 are replaced by the average of the two previous years because of an error in the statistics (communication with the Swiss Federal Tax Administration). Retirees include also the beneficiaries of invalidity benefits and people that work while receiving a pension. Taxpayers with temporary taxation or special tax agreements are excluded from the data. [3]See Appendix for details. [4]Source: Swiss Federal Tax Administration, *Charge fiscale en Suisse*. [5]Source: Swiss Federal Statistical Office. Data for cantons and municipalities. Culture includes culture, sport and religion; police includes fire service and police. [6]Source: Swiss Federal Social Insurance Office and Swiss Federal Statistical Office. [7]The property price index was provided to us by Wüest & Partner (a consultancy firm). [8]Source: Swiss Federal Statistical Office. Crime is measured as the number of sentences for murder, theft, robbery, swindle and rape. [9]Source: Swiss Federal Statistical Office. Data missing for AI in 1984, 1985, 1987-1990. Missing data are replaced by linear interpolation. [10]Source: Swiss Federal Statistical Office. AI and AR, seats held by left-of-centre representatives in cantonal governments.

Table 4: Responsiveness of the tax base. Baseline regressions

No controls included	(A) Elderly migrants[1]		(B) Nb of wealthy retirees[2] (in logs)		(C) Federal income tax (FIT) revenue from all retirees (in logs)		(D) FIT revenue from wealthy retirees (in logs)		(E) Per capita FIT revenue from wealthy retirees (in logs)	
AITR	1.429	-0.152	-0.021	-0.020	-0.017	-0.020	-0.045	-0.052	-0.024	-0.033*
	[6.857]	[7.383]	[0.049]	[0.046]	[0.042]	[0.039]	[0.058]	[0.054]	[0.021]	[0.020]
AITR in adjacent cantons		9.314		-0.015		0.031		0.084		0.099*
		[16.764]		[0.092]		[0.080]		[0.120]		[0.058]
Full set of controls included[3]										
AITR	-6.141	-7.187	0.000	0.002	-0.005	-0.005	-0.035	-0.036	-0.036*	-0.038**
	[6.534]	[7.226]	[0.033]	[0.031]	[0.031]	[0.030]	[0.046]	[0.044]	[0.019]	[0.018]
AITR in adjacent cantons		4.957		0.019		0.040		0.071		0.052
		[11.803]		[0.056]		[0.057]		[0.088]		[0.051]
Observations	494[4]	494[4]	494	494	494	494	494	494	494	494

Notes: *** p<0.01, ** p<0.05, * p<0.10. Standard errors (in brackets) are clustered by canton and year. All estimations include canton and year fixed effects. AITR is our measure for the average inheritance tax rate (see Appendix). AITR in adjacent cantons is the unweighted average of AITR of contiguous neighbour cantons.

[1]Net number of in-migrants aged over 65. [2]Retired taxpayers with net annual income over CHF 120,000. [3]Controls include: column (A): average income tax rate on retired taxpayer (index), average income tax rate on retired taxpayer (index) in adjacent cantons; columns (B)-(E): average income tax rate on retired taxpayer with income of CHF 150,000, average income tax rate on retired taxpayer with income of CHF 150,000 in adjacent cantons; all regressions: average wealth tax rate, average wealth tax rate in adjacent cantons, public expenditure on culture, police, health and other items (at $t-1$), pension support for low-income retirees (at $t-1$), property prices, crime rate, share of foreign population, share of low-income taxpayers, unemployment rate, and share of seats held by left-of-centre parties. [4]650 observations where no controls are included.

Table 5: Responsiveness of the tax base. Autoregressive model

No controls included	(A) Elderly migrants[1]		(B) Nb of wealthy retirees[2] (in logs)		(C) Federal income tax (FIT) revenue from all retirees (in logs)		(D) FIT revenue from wealthy retirees (in logs)		(E) Per capita FIT revenue from wealthy retirees (in logs)	
Lag of dependent variable (t-1)	0.316***	0.317***	1.105***	1.125***	1.194***	1.183***	1.097***	1.106***	1.097***	1.075***
	[0.041]	[0.041]	[0.038]	[0.028]	[0.017]	[0.017]	[0.029]	[0.026]	[0.044]	[0.055]
Lag of dependent variable (t-2)	0.227***	0.226***	-0.184***	-0.204***	-0.255***	-0.259***	-0.229***	-0.241***	-0.434***	-0.426***
	[0.045]	[0.045]	[0.055]	[0.054]	[0.047]	[0.048]	[0.041]	[0.040]	[0.053]	[0.055]
AITR (t)	-1.201	-1.358	-0.005	-0.003	-0.007	-0.005	-0.017	-0.014	-0.010	-0.010
	[7.810]	[7.904]	[0.021]	[0.023]	[0.018]	[0.019]	[0.026]	[0.026]	[0.019]	[0.019]
AITR (t-1)	-0.346	-0.051	-0.004	-0.010	0.009	0.003	0.022	0.012	0.026	0.022
	[10.629]	[10.683]	[0.026]	[0.028]	[0.022]	[0.023]	[0.033]	[0.033]	[0.023]	[0.023]
AITR (t-2)	1.062	0.959	0.005	0.009	-0.008	-0.004	-0.013	-0.008	-0.018	-0.017
	[8.246]	[8.343]	[0.022]	[0.023]	[0.019]	[0.020]	[0.027]	[0.027]	[0.019]	[0.019]
AITR in adjacent cantons (t)		1.786		0.102**		0.119***		0.176***		0.080*
		[17.384]		[0.050]		[0.042]		[0.059]		[0.043]
AITR in adjacent cantons (t-1)		11.844		-0.166**		-0.173***		-0.249***		-0.083
		[23.618]		[0.067]		[0.056]		[0.080]		[0.055]
AITR in adjacent cantons (t-2)		-12.881		0.078		0.077*		0.115*		0.041
		[18.276]		[0.054]		[0.046]		[0.064]		[0.045]
Long-term effect of AITR	-1.059	-0.984	-0.050	-0.048	-0.008	-0.008	-0.063	-0.074	-0.007	-0.015
Test long-term effect = 0 (*p value*)	*0.924*	*0.935*	*0.835*	*0.848*	*0.745*	*0.738*	*0.700*	*0.648*	*0.889*	*0.752*
Long-term AITR in adj. cant.		1.639		0.172		0.032		0.306		0.108
Test long-term effect = 0 (*p value*)		*0.947*		*0.793*		*0.545*		*0.401*		*0.306*

Continued on next page...

... Table 5 continued

Full set of controls included[3]	(A)		(B)		(C)		(D)		(E)	
Lag of dependent variable (t-1)	0.273***	0.270***	0.949***	0.960***	1.070***	1.085***	1.050***	1.061***	1.117***	1.138***
	[0.048]	[0.048]	[0.055]	[0.059]	[0.047]	[0.042]	[0.048]	[0.046]	[0.030]	[0.023]
Lag of dependent variable (t-2)	0.135***	0.131***	-0.149	-0.152	-0.224***	-0.238***	-0.216***	-0.230***	-0.445***	-0.458***
	[0.049]	[0.050]	[0.501]	[0.408]	[0.067]	[0.068]	[0.051]	[0.051]	[0.050]	[0.046]
AITR (t)	-6.136	-6.229	-0.004	-0.000	-0.009	-0.006	-0.022	-0.017	-0.017	-0.017
	[7.483]	[7.619]	[0.241]	[0.175]	[0.027]	[0.028]	[0.030]	[0.031]	[0.021]	[0.021]
AITR (t-1)	-0.627	-0.232	-0.006	-0.008	0.007	0.005	0.019	0.015	0.022	0.021
	[9.914]	[10.004]	[0.285]	[0.239]	[0.033]	[0.034]	[0.038]	[0.038]	[0.025]	[0.025]
AITR (t-2)	2.401	2.189	0.018	0.017	0.007	0.007	0.004	0.006	-0.024	-0.023
	[7.780]	[7.966]	[0.245]	[0.182]	[0.027]	[0.028]	[0.031]	[0.031]	[0.021]	[0.021]
AITR in adjacent cantons (t)		-6.492		0.110		0.122*		0.175**		0.058
		[17.408]		[0.423]		[0.065]		[0.073]		[0.049]
AITR in adjacent cantons (t-1)		21.029		-0.133		-0.146*		-0.226**		-0.078
		[21.565]		[0.488]		[0.081]		[0.091]		[0.060]
AITR in adjacent cantons (t-2)		-15.099		0.055		0.073		0.116		0.049
		[17.570]		[0.419]		[0.066]		[0.074]		[0.050]
Long-term effect of AITR	-7.375	-7.132	0.041	0.050	0.036	0.042	0.005	0.020	-0.059	-0.061
Test long-term effect = 0 (*p value*)	*0.429*	*0.476*	*0.969*	*0.956*	*0.812*	*0.791*	*0.976*	*0.900*	*0.322*	*0.328*
Long-term AITR in adj. cant.		-0.938		0.167		0.320		0.381		0.091
Test long-term effect = 0 (*p value*)		*0.966*		*0.929*		*0.372*		*0.273*		*0.486*
Observations	494[4]	494[4]	442	442	442	442	442	442	442	442

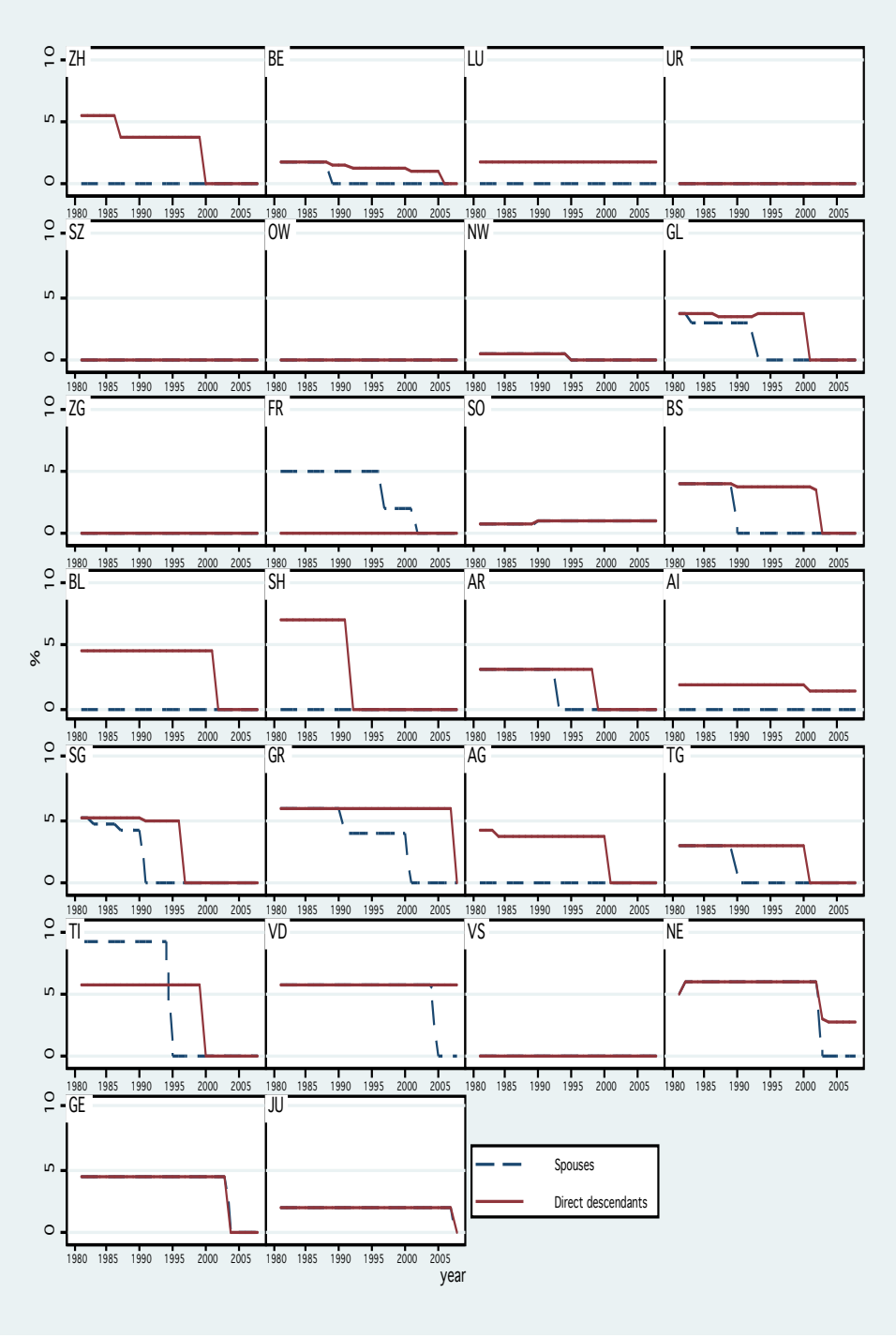
Notes: *** p<0.01, ** p<0.05, * p<0.10. Autoregressive model estimated by bias-corrected LSDV where the bias correction is initialized by the Anderson-Hsiao estimator and standard errors (in brackets) are bootstrapped with 1,000 replications. All estimations include canton and year fixed effects. AITR is our measure for the average inheritance tax rate (see Appendix). AITR in adjacent cantons is the unweighted average of AITR of contiguous neighbour cantons. Long-term effects are computed as the ratio of the sum of the coefficients on the relevant AITR over 1 minus the sum of the coefficients on the lag dependent variable.
[1]Net number of in-migrants aged over 65. [2]Retired taxpayers with net annual income over CHF 120,000. [3]See footnote 3 of Table 4. [4]598 observations where no controls are included.

Table 6: Responsiveness of bequest tax revenue

	Log inheritance tax revenue			
	Baseline model		Autoregressive model	
	(1)	(2)	(3)	(4)
Lag of dependent variable (t-1)			0.314***	0.302***
			[0.041]	[0.041]
Lag of dependent variable (t-2)			0.149***	0.147***
			[0.044]	[0.045]
Log AITR (t)	-0.265	-0.544	-0.139	-0.045
	[0.452]	[0.462]	[0.380]	[0.629]
Log AITR (t-1)			-0.697	-0.771
			[0.515]	[0.860]
Log AITR (t-2)			0.917*	0.584
			[0.493]	[0.714]
Log AITR^2 (t)	0.467**	0.548**	0.213	0.176
	[0.233]	[0.233]	[0.183]	[0.267]
Log AITR^2 (t-1)			0.409	0.437
			[0.251]	[0.370]
Log AITR^2 (t-2)			-0.443*	-0.320
			[0.229]	[0.307]
Log Population (t-1)		1.483		2.933
		[0.935]		[3.119]
Log Population (t-2)				-1.923
				[4.877]
Log Population (t-3)				-0.357
				[3.021]
Log Population (t-1)*AITR (t)		-0.181		0.142
		[0.454]		[0.478]
Log Population (t-2)*AITR (t-1)				0.088
				[0.653]
Log Population (t-3)*AITR (t-2)				-0.958*
				[0.569]
Log Population (t-1)*AITR^2 (t)		0.011		-0.071
		[0.236]		[0.220]
Log Population (t-2)*AITR^2 (t-1)				-0.123
				[0.301]
Log Population (t-3)*AITR^2 (t-2)				0.505*
				[0.268]
Observations	700	700	650	650
Implied extremum (in level)	1.328	1.643	0.797	1.486
0 = minimum, 1 = maximum	0	0	0	0
In-sample upper-bound (in level)			8.231	
In-sample average (in level)			3.424	
(Long-term) AITR elasticity	0.885	0.806	0.974	0.889
Test elasticity = 1 (*p value*)	*0.612*	*0.366*	*0.892*	*0.565*

Notes: *** p<0.01, ** p<0.05, * p<0.10. Baseline model: standard errors (in brackets) clustered by canton and year. Autoregressive model estimated with bias-corrected LSDV where the bias correction is initialized by the Anderson-Hsiao estimator and standard errors are bootstrapped with 1,000 replications. All estimations include canton and year fixed effects. AITR is our measure for the average inheritance tax rate (see Appendix). When interacted, population is mean-deviated. Implied extremum: see Section 3.3. Implied extrema in columns (2) and (4) are computed for a canton of average (population) size. Implied extrema in columns (3) and (4) are reported for implied long-run equilibrium values. Long-term effect of AITR are reported for a canton with an average AITR, and, in column (4), for a canton of average (population) size.

Figure 1: Average tax rate on an inheritance of CHF 500,000, by canton and heir category



Note: For full canton names, see Table 1. Source: Swiss Federal Tax Administration, *Charge fiscale en Suisse*, 1981-2008.

FIGURE 2: BEQUEST TAX REVENUE IN SWITZERLAND

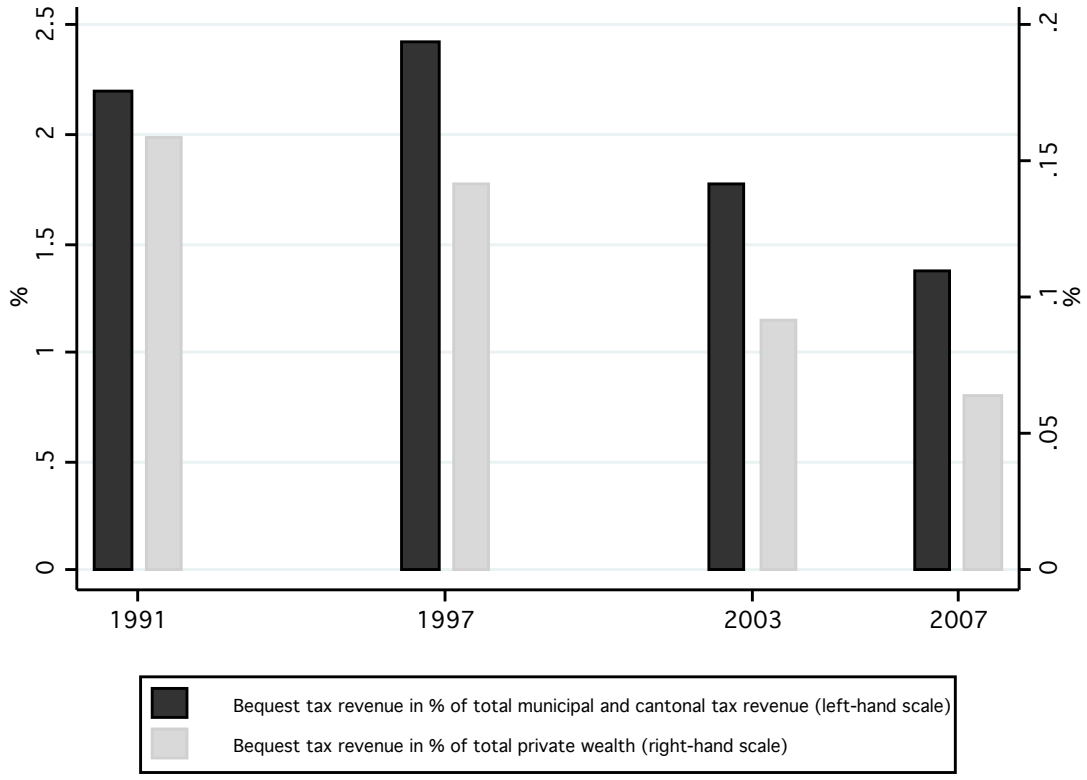
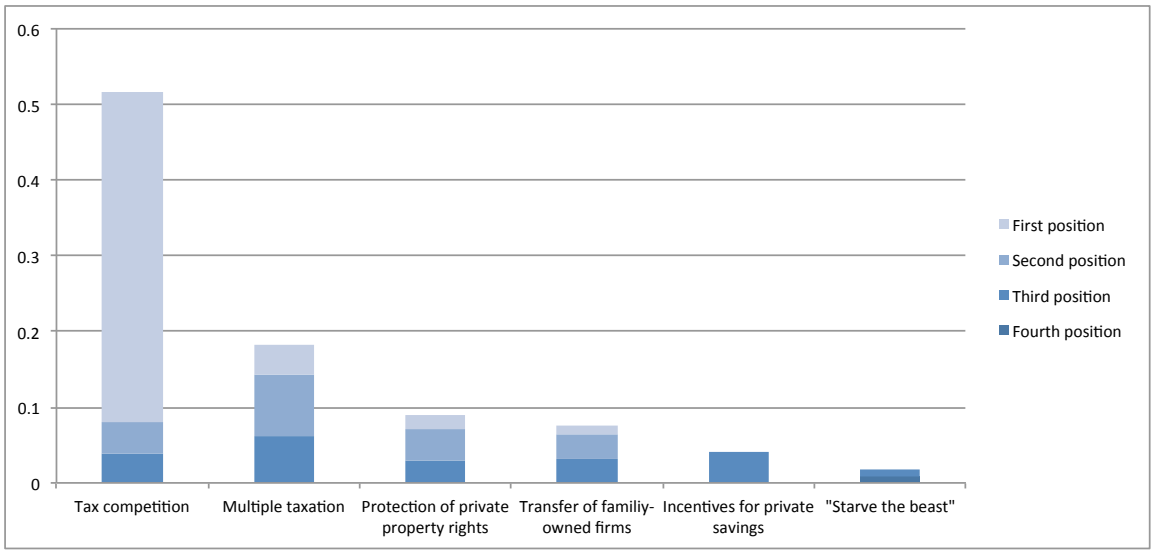
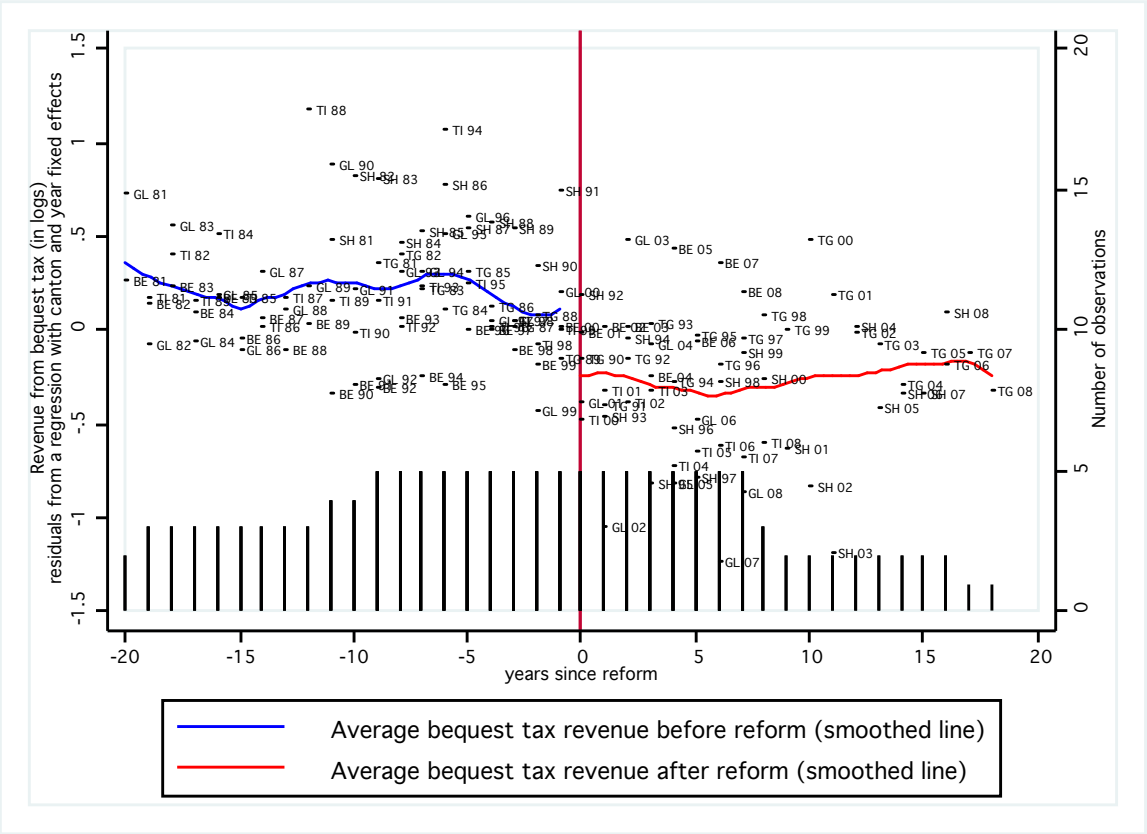


FIGURE 3: RELATIVE WEIGHT AND RANK OF MAIN ARGUMENTS IN FAVOUR OF BEQUEST TAX REFORMS



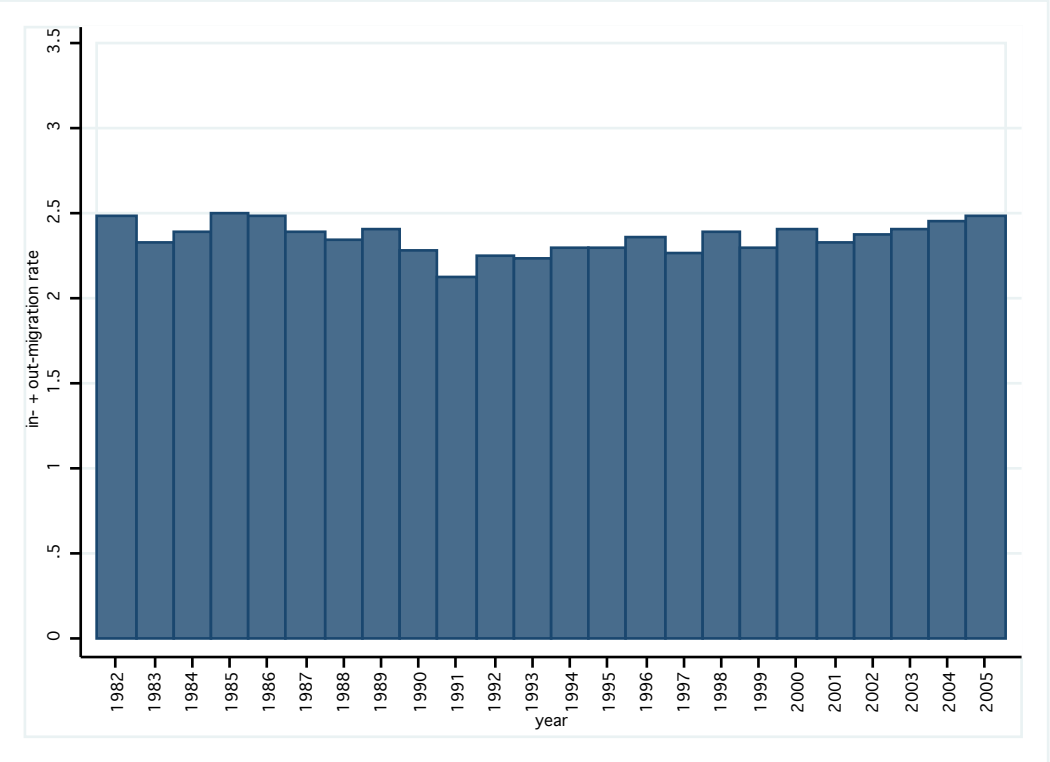
Note: Each bar shows the average over the 14 most important reforms of the relative frequencies of each class of pro-reform argument as given by the number of words. Bars show the order of appearance of each argument. Reforms are listed in Table 2.

FIGURE 4: LONG-TERM EFFECTS OF BEQUEST TAX REFORMS ON TAX REVENUE



Note: Points are residuals from a regression of the bequest tax revenue (in logs) on canton and year fixed effects in the five cantons with the most important tax cuts ($\geq 40\%$ of the AITR in absolute value). Nidwalden is not included (reform in 2007). Lines are obtained through Epanechnikov kernel-weighted local polynomial smoothing of degree one. Spikes above the horizontal axis represent the number of observations.

Figure 5: Historical pattern of elderly migration



Note: Average of canton in- + out-migration rates of people over 65 (in ‰ of total population).
Source: Swiss Federal Statistical Office.

Appendix: The construction of the AITR

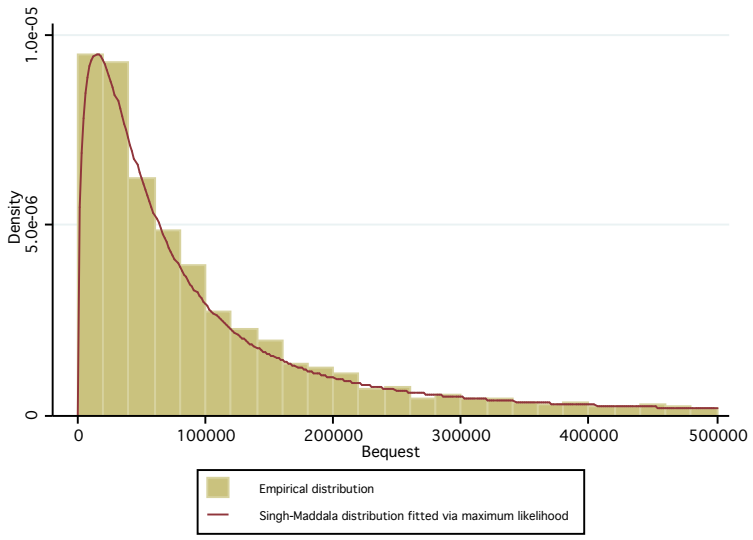
We first present the general methodology behind the construction of the AITR in the 22 cantons that levy inheritance taxes. Then, we shall explain our strategy to deal with the three cantons that tax estates rather than inheritances.

In 22 cantons, bequest taxes are due by the heirs at a rate depending on the degree of kinship with the deceased and on the inherited amount. For these cantons, official statistics published by the Swiss Federal Tax Administration ("Charge fiscale en Suisse") report average tax rates levied on six categories of heirs: spouses, direct descendants, brothers/sisters, uncles/aunts, nephews/nieces, and other heirs, for inheritances of CHF 20,000, 50,000, 100,000 and 500,000 in the 26 cantons between 1981 and 2008.[22] The published tax rates are defined as the ratio of the tax liability to the amount inherited, and thus reflect differences among cantons in terms of deductions and exemptions. We construct our AITR measure as a weighted average of these rates, where we weight the 24 different combinations of categories of heirs and inheritance size classes by the frequency of observed inheritances in each cell.

To compute these frequencies, we draw on a unique dataset of all inheritances in the canton of Vaud in the period from March 2002 to February 2003. Comparable data for the whole of Switzerland do not exist. The canton of Vaud is the third largest canton and appears to be representative: aggregate frequencies of inheritances across categories of heirs are comparable to those presented by Stutz (2007) for Switzerland as a whole. Based on these data, we construct weights as follows. We first fit continuous distributions across inheritance sizes for each category of heirs. We find the discrete distributions to be well approximated by a Singh-Maddala (1976) distribution, a special case of the generalised beta distribution with parameter $p = 1$ (see Appendix Figure 1). Based on these estimated distributions, we compute the frequencies of inheritances for each heir category using the following bounds: CHF 35,000, 75,000, and 300,000, adjusted for inflation using the consumer price index published by the Swiss Federal Statistical Of-

[22] In the cantons of Luzern, Fribourg, Graubünden and Vaud, municipalities may also tax bequests, either with their own schedule or by applying a multiplier on the cantonal tax rate. Official statistics lists average inheritance tax rates for the capital town in the four cantons. We add these rates to the cantonal rate.

Appendix Figure 1: Size distribution of inheritances in the canton of Vaud, 2002



Note: Size distribution of inheritances of all heirs.

Appendix Table 1: Distribution of total inheritances by category of heir in the canton of Vaud, 2002

	Number of inheritances		Inherited sum (in mios of CHF)	
Spouse	1,263	(16.68%)	389.768	(16.96%)
Direct descendant	4,663	(61.57%)	1,540.358	(67.04%)
Brother/sister	541	(7.14%)	97.114	(4.23%)
Uncle/aunt, nephew/niece	675	(8.91%)	167.974	(7.31%)
Other heir	431	(5.69%)	102.400	(4.46%)
Total	7,573		2,297.614	

Source: Statistical office of the canton of Vaud.

fice with 2002 as the reference year. Second, we weight these frequencies by the probability for each category of heirs to receive a bequest. These probabilities are presented in the second column of Appendix Table 1. Finally, we apply these weights computed for each sample year to our 24 combinations of official average tax rates in each canton for the years 1981-2008.

Three cantons, Graubünden, Solothurn and Neuchâtel (until 2003), levy an estate tax computed on the total bequeathed sum. In Graubünden, the estate tax is raised instead of the inheritance tax, while in Solothurn and Neuchâtel it is levied as a complement. In order to obtain comparable AITR measures for these three cantons, we infer an inheritance-tax equivalent from

Appendix Table 2: Inferred distribution of estates across heirs

	Estates in CHF						
	1,000,000	**500,000**	**200,000**	**100,000**	**50,000**	**20,000**	**10,000**
Spouse	313,615	156,808	62,723	31,362	15,681	6,272	3,136
Direct descendant (each)	313,203	156,602	62,641	31,320	15,660	6,264	3,132
Brother/sister	15,850	7,925	3,170	1,585	793	317	159
Uncle/aunt (each)	6,854	3,427	1,371	685	343	137	69
Nephew/niece (each)	6,854	3,427	1,371	685	343	137	69
Other heir	16,713	8,357	3,343	1,671	836	334	167

Note: See text for details.

the statistics of the Swiss Federal Tax Administration that report average estate tax rates levied on bequests of CHF 10,000, 20,000, 50,000, 100,000, 200,000, 500,000 and 1,000,000. For each size class, we impute the amount inherited by each type of heir according to the following scenario. We assume these estates to be shared between a surviving spouse, two children, one sibling, two uncles/aunts, two nephews/nieces and one other heir. We assume also that the surviving spouse and the two direct descendants receive at least their minimum legal share, that is 1/4 of the total estate for the surviving spouse and 3/8 for the two direct descendants. The remaining 3/8 are shared among all heirs (including the surviving spouse and direct descendants) according to the empirical distribution of total estates computed from the statistics of the canton of Vaud and listed in the last column of Appendix Table 1.

Appendix Table 2 presents the average inherited sum each type of heir would receive according to this scenario. Based on these numbers and on the published average tax rates levied on the seven different estate sizes, we approximate by binary search method the AITR that would apply on inheritances of CHF 20,000, 50,000, 100,000 and 500,000. For example, a direct descendant receiving an inheritance of CHF 100,000 corresponds, according to Appendix Table 2, to a bequest on an estate between CHF 200,000 and 500,000, taxed respectively at 1.9% and 3.9% in the canton of Graubünden in 2000. Therefore, we approximate the average inheritance tax rate in the canton of Graubünden in 2000 levied on a direct descendant for an inheritance of CHF 100,000 to be 2.7%.