

ALLEGED TAX COMPETITION: THE MYSTERIOUS DEATH OF INHERITANCE TAXES IN SWITZERLAND *

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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 overwhelmingly dominant 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, inheritance tax revenues are found to increase in inheritance tax rates even in the long run, and actual tax rates lie well below the revenue-maximising levels throughout. The alleged pressures of tax competition did not seem in reality to exist.

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1 Introduction

With people and capital becoming ever more mobile, tax competition continues to intensify. For individual governments, this means 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 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). Inheritance taxes on direct descendants have been repealed or significantly lowered by a majority of cantons in a domino-like process that began in the early 1990s.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 have to be lowered in order to retain them and, possibly, to attract additional ones. In this sense, recent Swiss policy changes mirror an 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

¹For 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).

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

³In subsequent work, however, the same authors detected no statistically significant evidence of a link between inheritance tax burdens and migration flows of elderly residents (Conway and Rork, 2006, 2009).

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

their assets into Singapore”.⁵

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 inheritance tax rates and the number of concerned residents, i.e. wealthy elderly individuals. Conversely, the relationship between inheritance tax rates and inheritance tax revenues is found to be robustly and statistically significantly positive, and revenue maximising inheritance tax rates are estimated to lie above the applied tax rates (pre-reform as well as post-reform) for all cantons. The alleged pressures from tax competition therefore appear not to have existed.

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. A similar verdict to that of Bakija and Slemrod (2004) emerges from the work of Conway and Rork (2006, 2009), 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. In addition to being based on a smaller country with even greater sub-federal heterogeneity of bequest taxation, our study differs from these US-based analyses in three main respects: we can relate canton-specific *revenue* raised by bequest taxation to canton-specific *rates* of bequest taxation, we have access to the aggregate data on movements of taxpayers, 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 (2008) 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 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

⁵www.prlog.org/10051481-singapore-abolished-estate-duty-tax-with-immediate-effects.html

⁶Our 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).

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 Graetz 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, implying that some of the observed erosion of state-level bequest taxation can be explained by the forces of intensified 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). 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 inheritance 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 estimates of tax-base responses to changes in bequest taxation, and in Section 5 we show how bequest tax revenues responded to those changes in tax rates. We conclude by summarising and discussing our findings in Section 6.

2 Bequest Taxation in Switzerland

2.1 Decentralisation and Reforms

The Swiss political system features an extraordinary 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 substan-

tially.⁷ Taxes are due by the heirs to the canton in which the deceased had his last fiscal residence. A notable exception is the transfer of real estate, representing around one third of the value of bequests, which - like in most countries, including the United States - 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. Inheritance tax rates vary in two main dimensions: the amount inherited (progressive taxation) and the family ties with the deceased (the closer the ties, the lower the tax rate). In our data sample that spans the period 1982 to 2005, spouses and direct descendants, representing about three quarters of all heirs, have been taxed at a top marginal rate of 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 inheritance taxes on direct descendants, the average tax rate is some 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 reforms has swept across the country since the early 1990s with the result of markedly lowering the bequest tax burden across all cantons. 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 2010, and none taxes inheritances by spouses. This is illustrated in Figure 1. Revenue raised from inheritance taxes represented some 1.4 percent of total sub-federal tax revenue in 2006, down from 2.4 in 1997.⁸ Scaled to total private wealth, inheritance tax revenue fell from 0.14 percent in 1997 to 0.06 percent in 2006 (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

One advantage of the broad based (direct) democratic decision-making procedures in Swiss cantons is that we can draw on comparable official documents laying out the arguments that dominated political discussions. All major reforms were preceded by vigorous public debate, and in 13 cases they were passed through referenda. We have analysed official voting brochures for reforms in 13 cantons, selected to include referenda as well as all reforms that implied a decrease in the average inheritance tax rate of more than

⁷In four cantons, municipalities can in addition levy their own bequest taxes (Fribourg, Graubünden, Luzern and Vaud).

⁸For comparison, estate and gift taxes in the US represented 0.6 percent of total tax revenue in 2006, down from 1.3 percent in 2000.

25 percent.⁹ Such brochures are issued routinely by cantonal governments to accompany public and parliamentary votes, laying out the arguments of the executive. In all cases, 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 in all 13 instances 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 65 percent text space, far ahead of alternative arguments for tax reform, such as the fact that taxing inheritances can be considered a form of multiple taxation (11%), that inheritance taxes may be viewed as infringing private property rights (9%), or that they might impede the transfer of family-owned firms (8%).

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 effect of inheritance tax reforms on inheritance tax *revenues*, we will be able to assess the fiscal impact of such reforms in the face of all conceivable avoidance strategies.

3 Empirical Strategy

3.1 Strong and Weak Tax Competition

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

The two questions are evidently linked. If, after testing the first question, one were to conclude that the tax base does 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

⁹For three cases, Zürich in 1987, Appenzell Ausserrhoden in 1993 and Nidwalden in 1995, we did not have access to official documents. The 13 reforms analysed are listed in Appendix Table 1.

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

change in the tax rate. However, since tax base responses are likely to be measured with error, 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. The essence 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. One may refer to this scenario as “strong” tax competition. For a validation of the strong tax-competition argument, one would therefore need to find a negative relationship between the inheritance tax rate and the associated tax revenue - akin to a Laffer effect -, controlling for other covariates and allowing for a sufficiently long adjustment period. In a corresponding “weak” version of the tax competition rationale, we would find that, while marginal tax revenue is positive with respect to the tax rate, it is less strongly positive in small jurisdictions than in large jurisdictions (see e.g. Bucovetsky, 1991).¹¹

3.2 Sensitivity of the Tax Base to the Tax Rate

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

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

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 inheritance tax burden, \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 regions (γ_{base}) and years (δ_{base}). We thereby control for all unobservable time-invariant region-specific features affecting the tax base, such as central location or attractive landscapes, and for all relevant unobservable region-invariant period-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 region-

¹¹More generally, one may argue that total regional income or regional welfare, other things equal, would be higher with a tax cut than without a tax cut. Given the difficulty of attributing changes in total regional income to changes in inheritance tax rates and of measuring welfare, we focus on the version of the argument that focuses on the link between tax rates and associated tax revenues.

period 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 inheritance taxation. We use five alternative measures of the tax base B_{it} :¹²

- (A) net in-migration of elderly residents (flow measure, age ≥ 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).

Measure (A) has the advantage of capturing inter-regional 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) to (E), while not offering a head count of affected residents, represent a precise measure of the actual tax base. The federal tax code applies identically across regions, it is strongly progressive (as are inheritance 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. In specification (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).

¹²Over our sample period the average exchange rate was 1.60 Swiss francs (CHF) to the U.S. dollar. Precise variable definitions are given in the data section below.

3.3 Sensitivity of Tax Revenue to the Tax Rate

Our second research question addresses the relationship between bequest tax rates and the associated tax revenue. This amounts to estimating the shape of the Laffer curve for local bequest taxation.

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 period 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 support strong version of the tax competition argument. If we were to reject the strong version but found the interaction between T_{it} and a measure of jurisdiction size to be significantly positive - implying that small jurisdictions lose less revenue by lowering their tax rate than large jurisdictions -, this would support the weak version of the tax competition argument.

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 the political base for reducing bequest tax burdens; 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 regional bequest tax schedules. Moreover, no convincingly exogenous variable that is related to changes in local bequest tax schedules is available.¹³ Yet, we argue that reverse causality is in fact unlikely to pose a serious problem for our research.

¹³One 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. These results are available on request.

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 immigration in total population equals 0.16 percent, and the mean share is 0.02 percent. These are mere population trickles, and 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.¹⁴ 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 regional 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 it 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 adjustment of migration patterns and tax revenues reacts sluggishly to changes in tax rates. That is why we also estimate autoregressive versions of our baseline equations, using first-order autoregressive distributed lag (ADL(1,1)) variants of our two empirical models:

$$B_{it} = \lambda_{baseADL} B_{it-1} + \alpha_{baseADL,t} T_{it} + \alpha_{baseADL,t-1} T_{it-1} + \beta'_{baseADL} \mathbf{X}_{baseADL,it} + \gamma_{baseADL,i} + \delta_{baseADL,t} + \varepsilon_{base,it} \quad (3)$$

$$R_{it} = \lambda_{revADL} R_{it-1} + \alpha_{1revADL,t} T_{it} + \alpha_{1revADL,t-1} T_{it-1} + \alpha_{2revADL,t} T_{it}^2 + \alpha_{2revADL,t-1} T_{it-1}^2 + \beta'_{revADL} \mathbf{X}_{revADL,it} + \gamma_{revADL,i} + \delta_{revADL,t} + \varepsilon_{revADL,it} \quad (4)$$

¹⁴In panel data for the United States, Conway and Rork (2006) find some evidence that migration patterns of the elderly do affect state-level bequest taxes. American residents, however, are significantly more mobile than Europeans. Their reported average gross annual state-level migration rate of elderly residents (inflows plus outflows of residents aged 65 and over) is 2.18 percent - the corresponding number for the Swiss cantons being an order of magnitude smaller, at 0.21 percent.

The ADL(1,1) 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 $\alpha_{\dots ADL,t-1} = -\alpha_{\dots ADL,t}/\lambda_{\dots ADL}$. 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 there are persistent shocks to the stochastic component of the dependent variable. In addition, (3) and (4) also nest the ADL(1,0) model, implying that $\alpha_{\dots ADL,t-1} = 0$. The ADL(1,0) 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.¹⁵ 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 a bias-corrected panel estimator, following 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 1987-2005.¹⁶

Our main measure of the relevant tax rate, T_{it} , is an index designed to quantify a representative inheritance tax burden. We construct the index as a weighted average of statutory inheritance tax rates applied to different

¹⁵For an exposition of common factor and partial adjustment models, see e.g. Davidson and MacKinnon (2004, ch. 7 and 13).

¹⁶The 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 2).

bequest size classes and categories of heirs, where we weight those classes by the frequency of observed bequests in each class (see Appendix B).¹⁷

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 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; property prices; crime rate; the proportion of poor taxpayers; the share of foreign residents and unemployment rate.¹⁸

4 Tax Rates and Tax Bases

Table 3 exhibits estimates of the responsiveness to inheritance tax rates of our five alternative measures of the tax base, estimated using equation (1). In the top 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 bottom panel of Table 3. For each specification, we furthermore show a version without and with controlling for the average tax burden of adjacent cantons.

In line with expectations, the tax effects are estimated to be negative in 18 of the 20 specifications. However, these results are statistically significant in only two instances, and even in those cases, the null hypothesis of no impact of inheritance taxes can only be rejected at the ten-percent level. These (borderline) statistically significant estimates are found when we take per-capita federal income tax revenue from wealthy retirees (measure E) as the dependent variable and we include the control variables. This suggests that changes in inheritance tax burdens have no statistically significant effect on the corresponding tax base except for the class of the very wealthiest retirees.

¹⁷As an alternative to this index, we have estimated all our models using the maximum statutory tax rate on specific inheritance scenarios as a proxy for T_{it} . None of our qualitative findings turned out to be affected by this choice. Results are available on request

¹⁸Some 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.

Table 4, which is organised analogously to Table 3, shows estimates for our five measures of the tax base in the ADL(1,1) specification. Implied long-run coefficients and their associated statistical significance levels are reported at the bottom of each panel. In these regression runs, we never find statistically significant effects of inheritance taxes. Moreover, the point estimates now turn (implausibly) positive in a majority of cases, including the specification for which we had found a significantly negative effect in the baseline runs.

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 region 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 inheritance tax rates.¹⁹

Our findings on the impact of changes in inheritance tax burdens on the relevant tax bases are easily summarised: we detect no effect, except for some (fragile and only weakly statistically significant) evidence of a negative impact on the very wealthiest retirees.

5 Tax Rates and Tax Revenues

Table 5 presents estimates of the responsiveness of inheritance tax revenue with respect to the inheritance tax rate. For the strong version of the tax-competition argument to be valid, we would need to see a negative effect in the long run. In contrast, Table 5 shows that the effect of the tax burden on inheritance tax revenues is positive both in the baseline and in the autoregressive variants of our empirical model.

Our results thus reject the strong version of the tax competition rationale. However, the weak version might still be present: if the mobility of tax bases were a factor in shaping the measured responsiveness of inheritance 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. In order to test this, we include interaction terms between the inheritance tax burden and the size of cantons (in terms of their populations). These coefficients, reported in the second and

¹⁹Results 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).

fourth columns of Table 5, are unexpectedly negative although they are not statistically significant. This indirect test, therefore, confirms our finding that the mobility of tax bases does not play a significant role in determining inheritance tax revenues of Swiss cantons.

Table 6 presents specifications that allow for potentially non-monotonic revenue effects of local bequest taxation, by considering second-degree polynomials of the variable measuring the tax burden. At the bottom of the table, we report the implied revenue-maximising tax rate, together with the maximum tax rate observed in the sample. In all estimation runs, actual tax rates lie below the revenue-maximising level, and revenue would increase if inheritance tax rates were raised.²⁰

Finally, Figure 4 illustrates the long-term effect of inheritance tax reforms on inheritance tax revenue for the sample of cantons that have experienced tax cuts corresponding to a decrease of more than 40% in our inheritance tax index. We plot average revenue in deviations from within-period canton means before and after the respective reforms. The graph suggests quite starkly, and in line with our previous findings, that cutting inheritance tax rates implied commensurate reductions inheritance tax revenues, even up to 15 years subsequent to those reforms.

6 Conclusion

We show that, in official political debates, tax competition provided the principal argument motivating a recent wave of cuts in inheritance tax burdens across Swiss cantons. However, we find these cuts to have had no discernible impact on migration patterns of elderly taxpayers overall, possibly a small impact on residential choices by the wealthiest elderly, and unambiguously negative implications for inheritance tax revenues. The alleged forces of tax competition do not in fact seem to have been at work.

This evidently begs 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 inheritance-tax reform other than the effects on tax revenue? The case of the disappearing bequest tax remains unsolved.

²⁰Our estimations are based on a log-level specification. Thus, as long as the revenue-maximising tax rate does not lie within our sample range, we cannot infer the implied functional form. Corresponding estimates of level-level specifications, while somewhat less precise, suggest a linear relationship. Our findings are also robust to alternative specifications, especially the inclusion of additional lags of the inheritance tax variable. They also remain essentially unaffected when we replace the case weighted inheritance tax index by a revenue-weighted index or by the top statutory rate. All these results are available on request.

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TABLE 1: MAJOR INHERITANCE TAX REFORMS

Canton	Year	Change	Main object of reform	Procedure	Decision date	Entry into force	Inheritance tax rate (1981-2007)	
							mean	min max
Cantons with major reforms								
Aargau (AG)	2001	-7.9%	Repeal tax on direct descendants	Referendum	18.04.1999	01.01.2001	2.50	2.37 2.83
Appenzell Ausserrhoden (AR)	1993	-6.5%	Repeal tax on spouses	Referendum ¹	26.04.1992	01.01.1993	4.20	3.16 5.30
	1999	-21.9%	Repeal tax on direct descendants	Parliamentary vote	27.09.1998	01.01.1999		
Basel-Landschaft (BL)	2001	+61.5%	Change tax rate	Parliamentary vote	21.05.2000	01.01.2001		
	2001	-27.1%	Repeal tax on direct descendants	Referendum	04.03.2001	05.03.2001	4.08	3.33 4.56
Basel-Stadt (BS)	1990	-13.9%	Repeal tax on spouses	Parliamentary vote	16.03.1989	01.01.1990	4.33	2.75 5.13
	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	3.14	1.71 4.03
	2001	-46.6%	Change tax rate	Parliamentary vote	23.11.1999	01.01.2001		
Fribourg (FR)	2006	-5.4%	Repeal tax on direct descendants	Parliamentary vote	23.11.2004	01.01.2006		
	1997	-7.1%	Repeal tax on spouses	Parliamentary vote	01.05.1996	01.01.1997	5.35	4.90 5.73
Geneva (GE)	2004	-27.4%	Repeal tax on direct descendants and spouses	Referendum	08.02.2004	01.06.2004	7.80	5.97 8.23
	2001	-68.7%	Repeal tax on direct descendants	Referendum ¹	07.05.2000	01.01.2001	3.35	1.32 4.27
Jura (JU)	2007	-19.8%	Repeal tax on direct descendants and spouses	Parliamentary vote	13.12.2006	01.01.2007	4.11	3.95 4.20
	2003	-9.6%	Repeal tax on spouses	Parliamentary vote	21.05.2002	01.01.2003	7.45	5.89 7.94
Neuchâtel (NE)	1995	-15.8%	Repeal tax on direct descendants and spouses	Referendum ¹	24.04.1994	01.01.1995	2.02	0.72 2.23
	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	3.02	1.52 5.29
	1991	-6.4%	Repeal tax on spouses	Parliamentary vote	09.05.1990	01.01.1991	3.89	3.38 4.36
St. Gallen (SG)	1997	-22.4%	Repeal tax on direct descendants	Referendum	08.06.1997	09.06.1997		
	1990	-48.8%	Repeal tax on spouses	Referendum	24.09.1989	01.01.1990	2.78	1.83 4.24
Thurgau (TG)	2001	-20.1%	Repeal tax on direct descendants	Parliamentary vote	24.05.2000	01.01.2001		
	1995	-11.9%	Repeal tax on spouses	Parliamentary vote	21.06.1994	01.01.1995	4.29	2.62 5.32
Ticino (TI)	2000	-44.1%	Repeal tax on direct descendants	Referendum	06.02.2000	01.01.2000		
	2005	-11.0%	Repeal tax on spouses	Referendum	16.05.2004	01.01.2005	6.40	5.79 6.85

Continued on next page...

... Table 1 continued

Canton	Year	Change	Main object of reform	Procedure	Decision date	Entry into force	Inheritance tax rate (1981-2007)		
							mean	min	max
Zürich	1987	-33.5%	Change tax rate	Referendum	28.09.1986	28.09.1986	2.87	2.28	3.96
	2000	-19.8%	Repeal tax on direct descendants	Referendum	28.11.1999	01.01.2000			
Cantons with no major reforms									
Appenzell Innerrhoden	(AI)						2.09	1.87	2.41
Graubünden	(GR)						4.91	4.47	5.69
Luzern	(LU)						4.03	3.48	4.18
Obwalden	(OW)						2.03	2.03	2.03
Schwyz	(SZ)						0.00	0.00	0.00
Solothurn	(SO)						3.51	3.32	3.60
Uri	(UR)						2.49	2.25	2.86
Valais	(VS)						3.25	3.25	3.25
Zug	(ZG)						1.55	1.45	1.82

Note: Major reforms include legislative acts repealing inheritance tax on direct descendants and/or spouses, as well as reforms implying a larger than 25% change in the inheritance tax index (in bold, see Appendix B for details).

¹ Landsgemeinde, ² Municipality of Chur, ³ Municipality of Luzern.

TABLE 2: LIST OF VARIABLES AND SUMMARY STATISTICS

Dependent variables	Mean	(Std. Dev.)	Min.	Max.	N
<i>Migration of people over 65</i> 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
<i>Number of retired taxpayers with net annual income (1987-2005)</i> 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
<i>Tax revenue (in CHF 1,000) from the federal income tax paid by retired taxpayers with net annual income (1987-2005)</i> 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
<i>Tax revenue (in CHF 1,000) from inheritance tax (1981-2007)</i> ¹					
... at canton & municipality level	34,767.66	(59,816.67)	0	529,918	702
Independent variables	Mean	(Std. Dev.)	Min.	Max.	N
<i>Inheritance tax (%) at canton & municipality level (1981-2007)</i> ³					
Inheritance tax index	3.68	(1.83)	0.00	8.23	702
<i>Average tax rate on... (1983-2005)</i> ⁴					
... income & wealth (index)	103.93	(21.49)	48.20	165.50	598
... wealth (index)	115.84	(57.17)	39.40	484.20	598
... retired (income) (index)	108.14	(43.44)	33.40	317.80	598
... retired with income of CHF 150,000 (%)	15.34	(3.76)	6.84	25.08	598
<i>Per capita public expenditure on...</i> 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
Proportion of low-income taxpayers ²	0.19	(0.07)	0.08	0.43	494
Unemployment rate (1983-2005) ⁹	2.19	(1.79)	0.05	7.81	598
Proportion of seats held by left-of-centre representatives in cantonal parliaments ¹⁰	0.22	(0.13)	0.00	0.51	646

¹Source: Swiss Federal Statistical Office. ²Source: 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 as well as low-income people who do not pay Federal income tax. ³See Appendix B for details. ⁴Source: Swiss Federal Tax Administration *Charge fiscale en Suisse*. ⁵Source: Swiss Federal Statistical Office. Data for cantons and municipalities. Culture includes culture, sport and religion; police includes fire service and police. ⁶Source: Swiss Federal Social Insurance Office. Data for TI, VD, VS and NE in 1986 are from the Swiss Federal Statistical Office. From 1981 to 1997, only data on the number of cases are available. Following the methodology of the Swiss Federal Social Insurance Office *Statistiques des prestations complémentaires de l'AVS et l'AI*, the number of beneficiaries is interpolated with 120 beneficiaries corresponding to 100 cases. ⁷Source: Wüest & Partner. ⁸Source: Swiss Federal Statistical Office. Crime is measured as the number of sentences for murder, theft, robbery, swindle and rape. ⁹Source: Swiss Federal Statistical Office. Data missing for AI in 1984, 1985, 1987-1990. Missing data are replaced by linear extrapolation. ¹⁰Source: Swiss Federal Statistical Office. AI and AR, seats held by left-of-centre representatives in cantonal governments (1981 and 1982 missing).

TABLE 3: RESPONSIVENESS OF THE TAX BASE. BASELINE REGRESSIONS

	(A) Elderly migrants ¹	(B) Nb of wealthy retirees ² (in logs)	(C) Federal income tax (FIT) revenue of all retirees (in logs)	(D) FIT revenue of wealthy retirees (in logs)	(E) Per capita FIT revenue of wealthy retirees (in logs)
No controls included					
Inheritance tax	1.361 [6.920]	-0.025 [0.049]	-0.019 [0.042]	-0.047 [0.057]	-0.022 [0.021]
Inheritance tax in adjacent cantons	12.010 [16.380]	-0.048 [0.084]	0.002 [0.073]	0.044 [0.108]	0.093* [0.053]
Full set of controls included³					
Inheritance tax	-6.324 [6.728]	-0.006 [0.033]	-0.008 [0.031]	-0.038 [0.046]	-0.032* [0.018]
Inheritance tax in adjacent cantons	5.173 [11.343]	-0.014 [0.048]	0.011 [0.053]	0.032 [0.080]	0.046 [0.050]
Observations	494 ⁴	494	494	494	494

Note: Standard errors are clustered by canton and year. *** p<0.01, ** p<0.05, * p<0.10. All estimations include canton and year fixed effects.

¹Net number of immigrants over 65. ²Retired taxpayers with net annual income over CHF 120,000. ³Controls include: income tax, income tax in adjacent cantons, wealth tax, wealth tax in adjacent cantons, public expenditure on culture, police, health and others (at $t - 1$), pension support for low-income retirees (at $t - 1$), property prices, crime rate, share of foreign population, proportion of low-income taxpayers, unemployment rate, and proportion of seats held by left-of-centre parties. ⁴650 observations where no controls are included.

TABLE 4: RESPONSIVENESS OF THE TAX BASE. AUTOREGRESSIVE MODEL

	(A) Elderly migrants ¹	(B) Nb of wealthy retirees ² (in logs)	(C) Federal income tax (FIT) revenue of all retirees (in logs)	(D) FIT revenue of wealthy retirees (in logs)	(E) Per capita FIT revenue of wealthy retirees (in logs)
No controls included					
Inheritance tax	1.088 [9.204]	-0.013 [0.022]	-0.006 [0.019]	-0.016 [0.024]	-0.006 [0.022]
Lag of inheritance tax	-1.192 [9.636]	0.008 [0.023]	0.018 [0.019]	0.023 [0.025]	0.013 [0.024]
Inheritance tax in adjacent cantons	10.270 [19.471]	-0.048 [0.049]	0.002 [0.038]	-0.002 [0.052]	0.052 [0.049]
Lag of inherit. tax in adj. cantons	-4.319 [20.585]	0.048 [0.052]	0.055 [0.040]	0.031 [0.055]	-0.017 [0.052]
Lag of dependent variable	0.447*** [0.040]	0.931*** [0.071]	1.122*** [0.034]	0.920*** [0.064]	0.725*** [0.053]
Long-term effect of inheritance tax	-0.188 <i>0.984</i>	-0.080 <i>0.760</i>	0.033 <i>0.763</i>	0.086 <i>0.736</i>	0.034 <i>0.571</i>
<i>p value</i>					
Long-term inherit. tax in adj. cant.	10.750	0.001	-0.479	0.352	0.129
<i>p value</i>	<i>0.613</i>	<i>0.998</i>	<i>0.086</i>	<i>0.490</i>	<i>0.316</i>

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... Table 4 continued

	(A) Elderly migrants ¹	(B) Nb of wealthy retirees ² (in logs)	(C) Federal income tax (FIT) revenue of all retirees (in logs)	(D) FIT revenue of wealthy retirees (in logs)	(E) Per capita FIT revenue of wealthy retirees (in logs)
Inheritance tax	-4.581 [7.887]	-0.013 [0.095]	-0.012 [0.030]	-0.025 [0.029]	-0.014 [0.024]
Lag of inheritance tax	-0.749 [8.072]	0.014 [0.099]	0.019 [0.031]	0.032 [0.030]	0.016 [0.025]
Inheritance tax in adjacent cantons	0.538 [18.487]	-0.051 [0.226]	-0.029 [0.067]	-0.029 [0.064]	0.025 [0.055]
Lag of inherit. tax in adj. cantons	2.820 [18.325]	0.065 [0.231]	0.063 [0.068]	0.067 [0.065]	0.001 [0.056]
Lag of dependent variable	0.293*** [0.048]	0.819*** [0.051]	0.895*** [0.070]	0.890*** [0.063]	0.700*** [0.050]
Long-term effect of inheritance tax <i>p value</i>	-7.544 0.323	0.003 0.994	0.067 0.776	0.061 0.771	0.010 0.872
Long-term inherit. tax in adj. cant. <i>p value</i>	4.725 0.787	0.078 0.939	0.318 0.558	0.329 0.485	0.085 0.533
Observations	494 ⁴	468	468	468	468

Note: Bootstrapped standard errors with 1,000 replications. *** 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. All estimations include year fixed effects.

¹Net number of immigrants over 65. ²Retired taxpayers with net annual income over CHF 120,000. ³See footnote 3 of Table 3. ⁴624 observations where no controls are included

TABLE 5: RESPONSIVENESS OF INHERITANCE TAX REVENUE

	Inheritance tax revenue (in logs)			
	Baseline model ¹		Autoregressive model ²	
Inheritance tax	0.225*** [0.058]	0.218*** [0.055]	0.093** [0.043]	0.090** [0.044]
Lag of inheritance tax			0.079* [0.045]	0.078* [0.046]
Population ³		-0.104 [0.196]		0.419 [0.846]
Lag of population				-0.471 [0.874]
Population * inheritance tax		-0.018 [0.011]		-0.007 [0.017]
Lag of pop. * inheritance tax				-0.005 [0.018]
Lag of dependent variable			0.332*** [0.040]	0.329*** [0.040]
Observations	675	675	650	650
Long-term effect			0.259***	0.252***
<i>pvalue</i>			0.000	0.000
Long-term effect of interaction term				-0.018
<i>pvalue</i>				0.117

Note: Baseline model: standard errors clustered by canton and year. Autoregressive model: bootstrapped standard errors with 1,000 replications. *** p<0.01, ** p<0.05, * p<0.10.

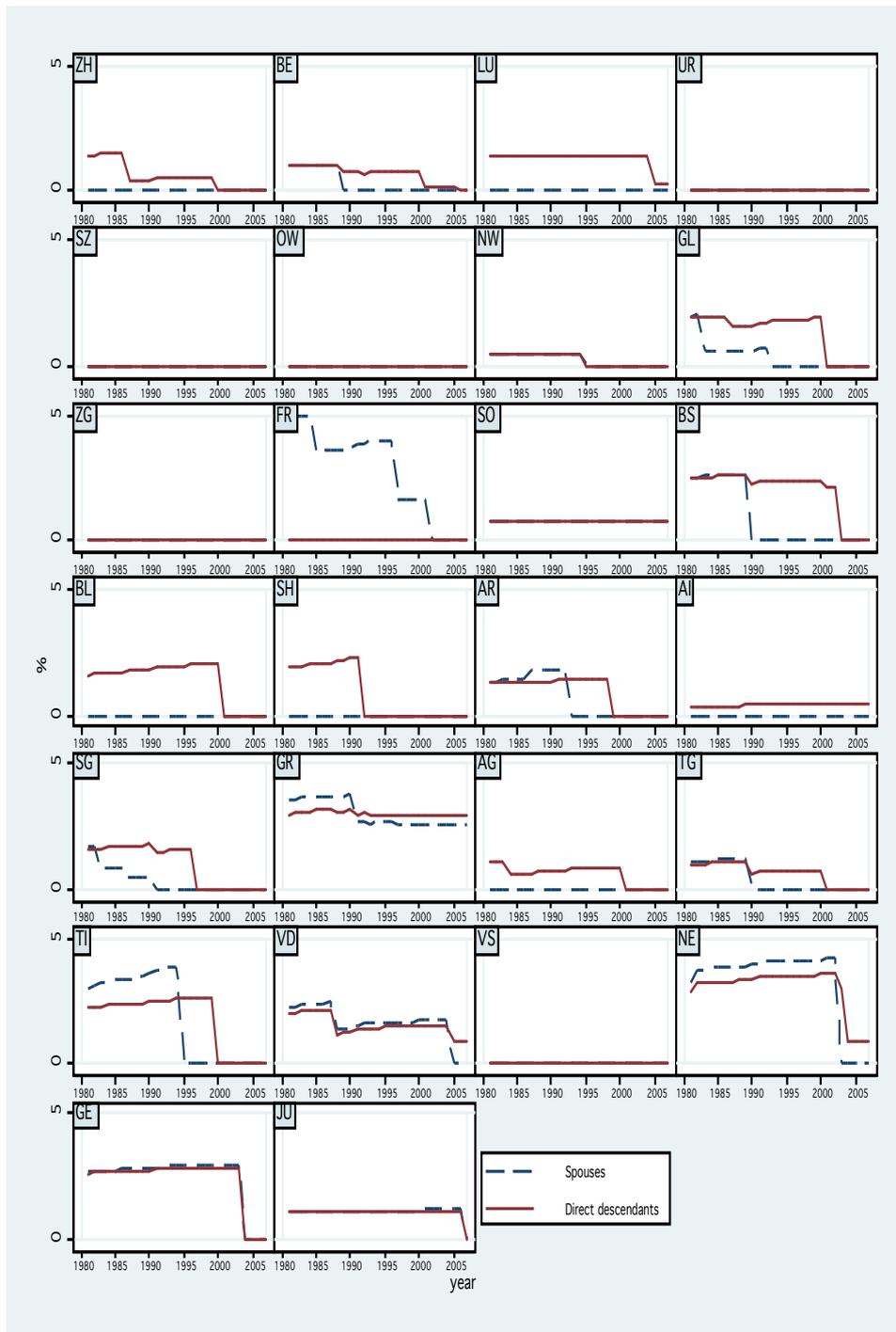
¹Baseline models include canton and year fixed effects. ²Autoregressive model estimated with bias-corrected LSDV where the bias correction is initialized by the Anderson-Hsiao estimator. Estimations of the autoregressive model include year fixed effects. ³Population is included with a one-year lag.

TABLE 6: RESPONSIVENESS OF INHERITANCE TAX REVENUE.
POLYNOMIAL SPECIFICATION

	Inheritance tax revenue (in logs)			
	Baseline model ¹		Autoregressive model ²	
Inheritance tax	0.362*** [0.092]	0.380*** [0.084]	0.206 [0.128]	0.183 [0.133]
Lag of inheritance tax			0.020 [0.139]	0.060 [0.142]
Square of inheritance tax	-0.018* [0.010]	-0.021** [0.009]	-0.014 [0.015]	-0.011 [0.016]
Lag of inheritance tax squared			0.007 [0.016]	0.001 [0.017]
Population ³		-0.107 [0.213]		0.211 [0.856]
Lag of population				-0.235 [0.899]
Population * inheritance tax		-0.044 [0.052]		0.038 [0.057]
Lag of population * inheritance tax				-0.093 [0.061]
Population * inheritance tax squared		0.004 [0.009]		-0.006 [0.008]
Lag of pop. * inheritance tax squared				0.013 [0.009]
Lag of dependent variable			0.332*** [0.040]	0.326*** [0.040]
Observations	675	675	650	650
Implied extremum	9.985	8.856	15.630	12.570
In-sample upper-bound	8.233	8.233	8.233	8.233
In-sample average	3.673	3.673	3.673	3.673

Note: Baseline model: standard errors clustered by canton and year. Autoregressive model: bootstrapped standard errors with 1,000 replications. *** p<0.01, ** p<0.05, * p<0.10.
¹Baseline models include canton and year fixed effects. ²Autoregressive model estimated with bias-corrected LSDV where the bias correction is initialized by the Anderson-Hsiao estimator. Estimations of the autoregressive model include year fixed effects. ³Population is included with a one-year lag.

FIGURE 1: AVERAGE INHERITANCE TAX INDEX BY CANTON AND HEIR CATEGORY



Note: For full canton names, see Table 1.

FIGURE 2: INHERITANCE TAX REVENUE IN SWITZERLAND

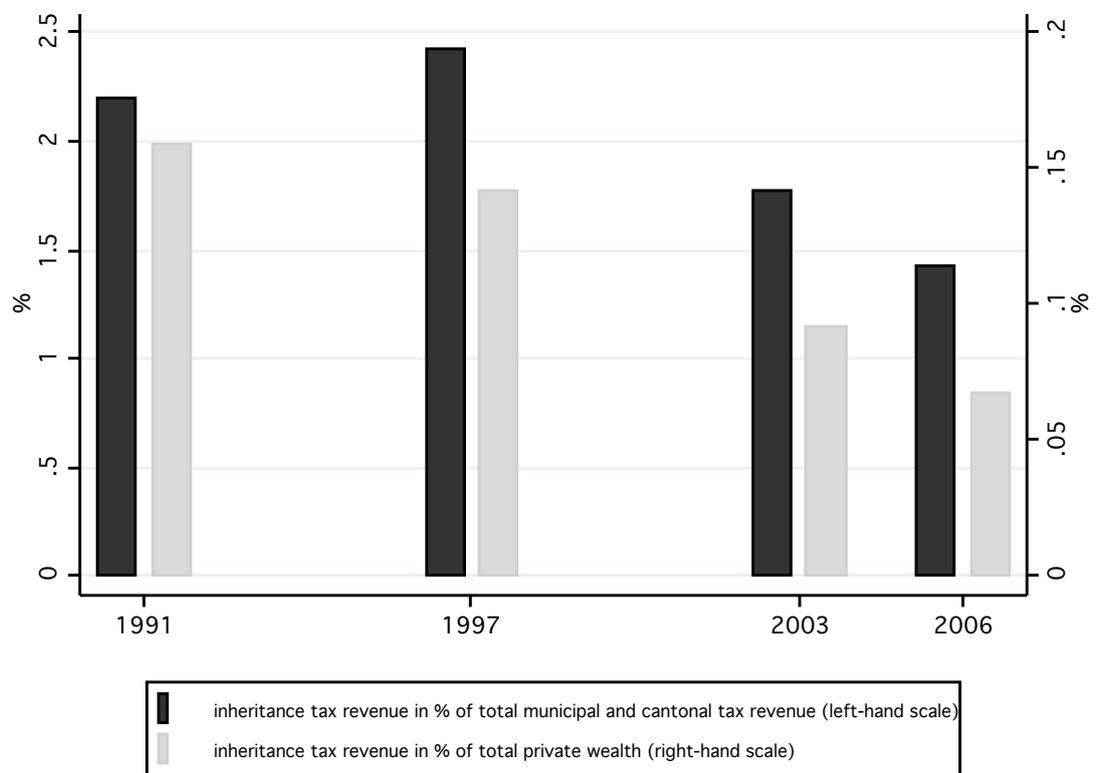
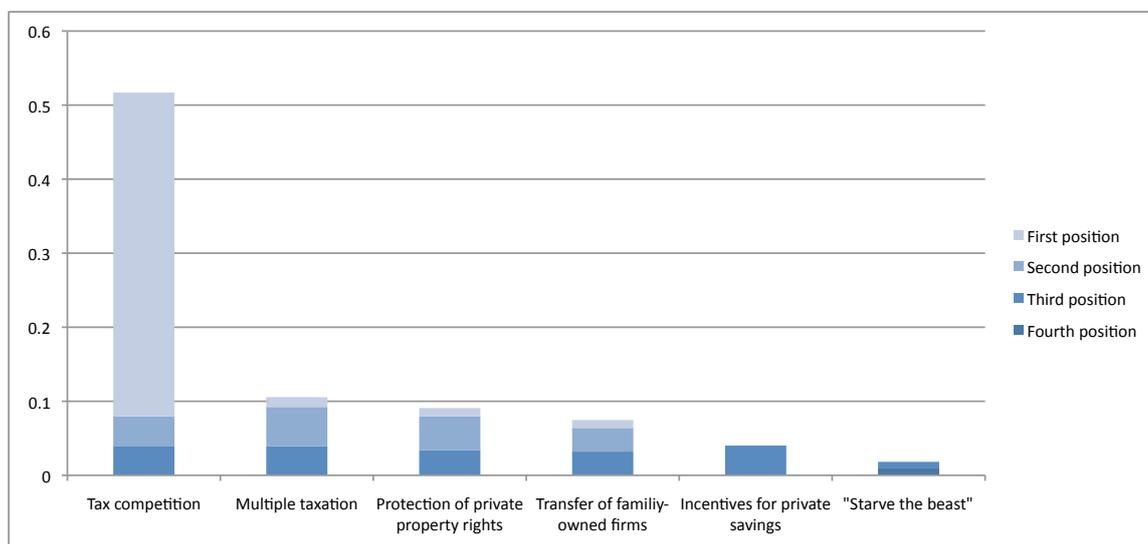
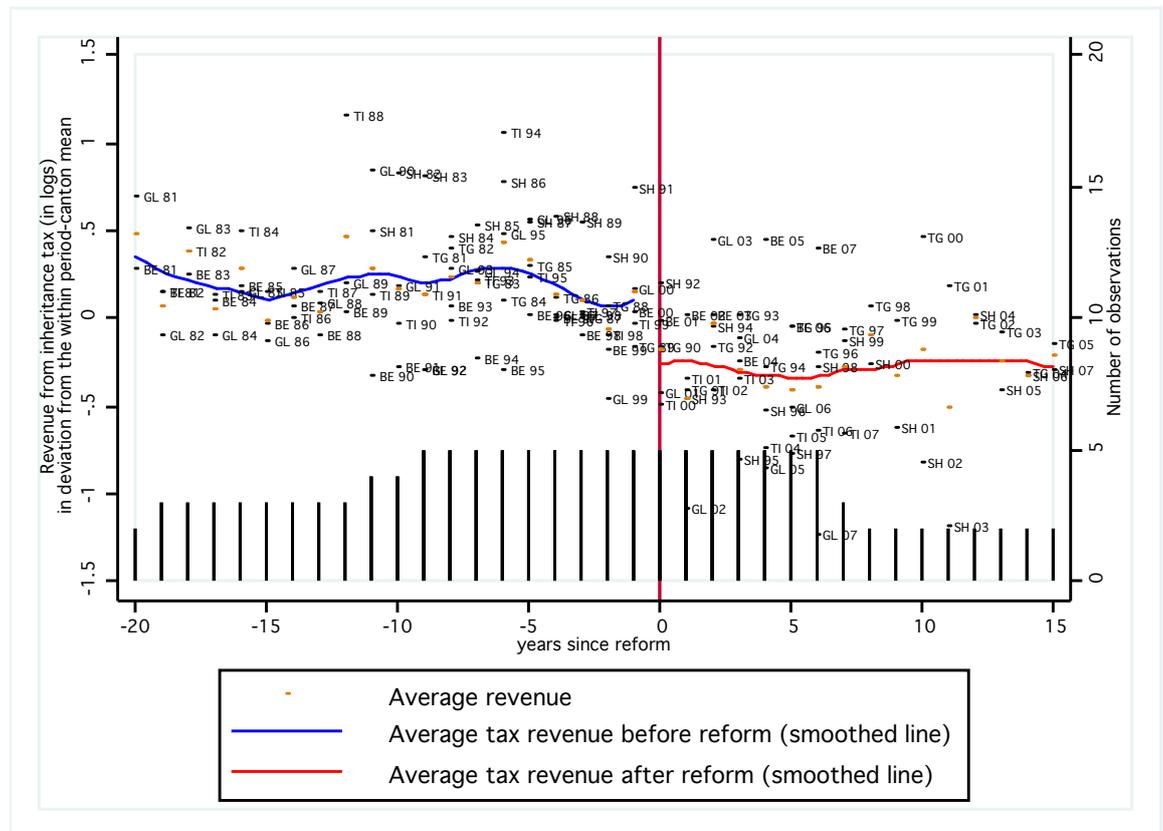


FIGURE 3: RELATIVE WEIGHT AND RANK OF MAIN ARGUMENTS IN FAVOUR OF INHERITANCE TAX REFORMS



Note: Each bar shows the average over the 13 most important reforms of the relative frequencies of each class of pro-reform argument as given by the number of words. Bars are divided into the relative order of appearance of each argument. Reforms are listed in Appendix Table 1.

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



Note: Points represent inheritance tax revenue before and after the reform in the five cantons with the most important tax cuts ($\geq 40\%$ of the tax index in absolute value). Lines are obtained through Epanechnikov kernel-weighted local polynomial smoothing of degree one. Spikes are the number of observations.

Appendix A: Document analysis

APPENDIX TABLE 1: DOCUMENTS USED FOR THE ANALYSIS OF MAJOR POLITICAL ARGUMENTS IN FAVOUR OF INHERITANCE 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
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	Abstimmungserläuterungen 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

¹For full canton names, see Table 1.

²Change in percentage points of inheritance tax index. See Appendix B for a description.

³<http://www.amtsblatt.zh.ch>.

⁴<http://www.landsgemeinde.gl.ch/2000/pdf/memorial.pdf>.

⁵http://www.baselland.ch/erl_erbschaft-hm.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/>.

Appendix B: The inheritance tax index

Here, we present the construction of our main explanatory variable, the average inheritance tax burden by canton and year. Our index has to capture the main characteristics of the inheritance tax system: the tax is due by the heirs at a rate depending on the degree of kinship with the deceased and on the inherited amount (progressive taxation). Some cantons have different rules: the cantons of Solothurn, Graubünden and Neuchâtel levy a tax on estates, and in Luzern, Fribourg, Graubünden and Vaud municipalities are allowed to levy their own inheritance tax.²¹

We have collected statutory tax rates levied on six categories of heirs: direct descendants, spouses, brothers/sisters, uncles/aunts, nephews/nieces, and non-parents for inheritances of CHF 20,000, 50,000, 100,000 and 500,000 in the 26 cantons between 1981 and 2007.²² We added to the cantonal rate the municipal rate of the capital town in the four cantons that allow municipalities to levy an inheritance tax.²³

Information on the size and kinship distribution of inheritances is taken from inheritance statistics for the canton of Vaud in the period from March 2002 to February 2003.²⁴ These data are presented in Appendix Table 2. For each category of heirs, we estimate the conditional distribution of inheritances.²⁵ We find that this distribution is well approximated by a Singh-Maddala distribution.²⁶ Appendix Figure 1 presents the estimated unconditional distribution together with the empirical histogram.

²¹Neuchâtel abolished its estate tax in 2003; In Luzern, municipalities can levy an inheritance tax only on direct descendants.

²²Statutory tax rates are available in the publication *Charge fiscale en Suisse* published by the Swiss Federal Tax Administration.

²³The administrative centers are Luzern, Fribourg, Chur, and Lausanne.

²⁴We thank the statistical office of the canton of Vaud (SCRIS) for providing us with these data.

²⁵As these data do not distinguish between uncles/aunts and nephews/nieces, we assume these two categories to be equally represented.

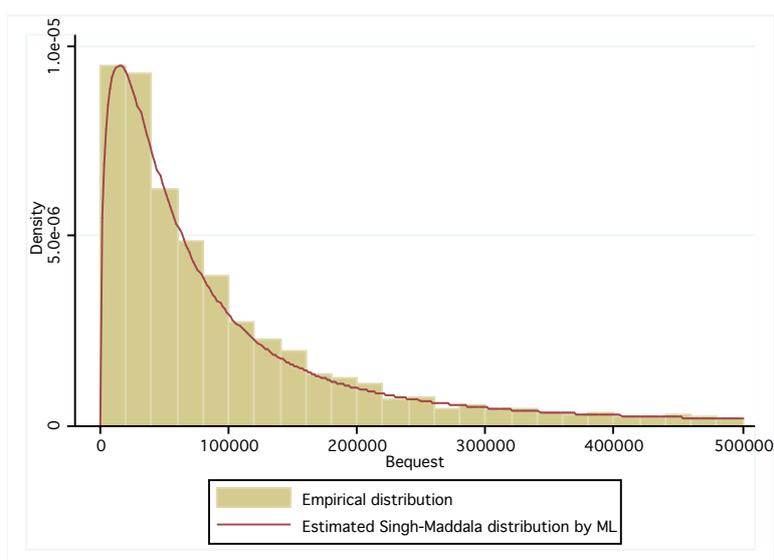
²⁶See Singh and Maddala (1976). This follows the literature on income distribution. For a review, see Kleiber and Kotz (2003). The Singh-Maddala distribution is a special case of the generalised beta distribution of the second kind with parameter $p = 1$. We tested this restriction as well as others. The Singh-Maddala distribution was never rejected. Parameters are estimated by maximum likelihood.

APPENDIX TABLE 2: FREQUENCIES BY INHERITANCE CLASS FOR THE CANTON OF VAUD (MARCH 2002-FEBRUARY 2003)

	Inheritance classes (CHF)									
	0-34,999		35,000-74,999		75,000-299,999		300,000 and more		Total	
Spouses	262	11.5%	267	15.6%	526	20.7%	208	19.8%	1,263	16.7%
Direct descendants	1,205	53.1%	1,142	66.9%	1,622	63.7%	694	66.2%	4,663	61.6%
Brothers/sisters	243	10.7%	110	6.4%	144	5.7%	44	4.2%	541	7.1%
Uncles/aunts, nephews/nieces	319	14.1%	124	7.3%	169	6.6%	63	6.0%	675	8.9%
Non-parents	241	10.6%	64	3.7%	86	3.4%	40	3.8%	431	5.7%
Total	2,270	100.0%	1,707	100.0%	2,547	100.0%	1,049	100.0%	7,573	100.0%

Source: Statistical office of the canton of Vaud

APPENDIX FIGURE 1: HISTOGRAM AND SINGH-MADDALA ESTIMATION OF THE SIZE DISTRIBUTION OF BEQUESTS FOR THE CANTON OF VAUD



To weight between the different tax rates applied on inheritances of CHF 20,000, 50,000, 100,000 and 500,000, we compute the frequencies of inheritances for each heir category in the following intervals: less than CHF 35,000, between 35,000 and 75,000, 75,000 and 300,000 and more than 300,000. These intervals are adjusted for inflation for each sample year using the consumer price index published by the Swiss Federal Statistical Office.

The cantons of Graubünden, Solothurn and Neuchâtel (until 2003) levy

an estate tax computed on the total bequeathed sum, regardless of the degree of kinship with the deceased. In Graubünden, this tax is raised instead of the inheritance tax while in Solothurn and Neuchâtel it is levied as a complement. Data on estates of CHF 10,000, 20,000, 50,000, 100,000, 200,000, 500,000 and 1,000,000 are available from the Swiss Federal Tax Administration.

We infer from these data an equivalent inheritance tax in the following manner. We estimate the distribution of total estates between each category of heirs from the statistics of the canton of Vaud. Following these data, direct descendants received 67.04 % of total estates, spouses 16.96 %, siblings 4.23 %, uncles/aunts, nephews/nieces 7.31%, and non-parents 4.46 %. We assume that a representative estate is shared between the surviving spouse, two children, one sibling, two uncles/aunts, two nephews/nieces and one non-parent, and so compute the average inherited sum by category of heirs. Results are presented in Appendix Table 3.²⁷ Based on this scenario, we approximate numerically the tax rate that would be levied on inherited sums of CHF 20,000, 50,000, 100,000 and 500,000.²⁸

APPENDIX TABLE 3: INFERRED DISTRIBUTION OF ESTATES AMONG HEIRS

Heir	Estates in CHF						
	1,000,000	500,000	200,000	100,000	50,000	20,000	10,000
Spouses	250,000	125,000	50,000	25,000	12,500	5,000	2,500
Direct descendants	335,208	167,604	67,042	33,521	16,760	6,704	3,352
Brothers/sisters	42,267	21,134	8,453	4,227	2,113	845	423
Uncles/aunts, nephews/nieces	18,277	9,138	3,655	1,828	914	366	183
Non-parents	44,568	22,284	8,914	4,457	2,228	891	446

Source: Statistical office of the canton of Vaud

The average inheritance tax index by canton is presented in Table 1. Plots of the average inheritance tax index over time by canton are presented in Figure 1 for spouses and direct descendants.

²⁷For spouses, we use the minimum legal share (1/4 of the estate).

²⁸For example, a surviving spouse who received an inheritance of CHF 20,000 corresponds approximately, following Appendix Table 3, to a bequest on an estate between CHF 50,000 and 100,000.