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## ON GOVERNMENT CENTRALIZATION AND BUDGET REFERENDUMS: EVIDENCE FROM SWITZERLAND

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### Abstract

Previous theoretical and empirical research has shown that policymakers have an incentive to centralize government activities in order to weaken the competitive pressure of fiscal federalism. We propose and test a positive model of fiscal federalism in which centralization is less likely to occur where budget referendums are possible. The reason for this result is that budget referendums reduce the extent to which pro-centralization regions can commit to a low level of spending delegating the centralization choice to elected policymakers. In addition, it reduces the ability of higher level policymakers to attract additional responsibilities in order to gain policy discretion. Empirical findings from a panel data analysis for Swiss cantons from 1980 to 1998 support this hypothesis

JEL Classification: H1, H7, D72.

Keywords: centralization, fiscal federalism, budget referendums.

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*There is a limit to the extent of country  
which can advantageously be governed,  
or even whose government can be conveniently  
superintended, from a single centre.*

*John Stuart Mill, 1861*

## **I. Introduction**

A number of economists and political scientists have been concerned with the normative question of an optimally designed federalist constitution. In addition to arguments for a vertical separation of powers, brought forward by Montesquieu and de Tocqueville, James Madison already emphasized that a decentralized provision of public services best helps satisfying different needs arising from local or regional particularities: In *Federalist 10*, he contended that the great and aggregate interests should be referred to the national, the local and in particular to the state legislatures (HAMILTON, MADISON and JAY, 1787/88). OATES (1972, p. 11) argues that decentralization is appropriate if residents in different sub-federal jurisdictions have different tastes for public services. A uniform provision of the service at the federal level would leave both, the residents who want more of a public good and the residents who want less of a public good, worse off. Consequently, he proposes his *Decentralization Theorem* as a guideline for the distribution of fiscal competencies among different tiers of government: In the absence of inter-jurisdictional externalities and economies of scale in the provision of public services, decentralization of government activities is preferable.

The normative theory of fiscal federalism has developed conditions under which centralization of government activities or coordination among sub-federal governments are reasonable. Interregional externalities in the form of cost or benefit spillovers provide arguments for coordination activities. The larger distortions by regional externalities, the more useful centralization may become. Similarly, tax competition may lead to fiscal externalities between jurisdictions and provide reasons for centralization. In addition, economies of scale in the consumption of public services can be exploited by a centralized provision. With respect to income redistribution, centralization may be useful to circumvent income segregation between sub-federal jurisdictions. If decentralized redistribution takes place and individuals are mobile, the rich move to places where they pay low (progressive) income taxes while the poor move to jurisdictions with high transfers. Finally, macroeconomic stabilization can be provided more effectively at the federal level. There are also theoretical arguments against each of these reasons for centralization. For example, fiscal and regional externalities may offset

each other (SØRENSEN, 2000) or these externalities may be internalized by voluntary transfers between jurisdictions (MYERS, 1990). The normative question to what extent government services and tasks should be de-centralized is thus contested in the literature.<sup>1</sup>

Recently, BESLEY and COATE (1999) challenged this welfare theoretical approach: In a framework of benevolent governments that take different tastes of people in different jurisdictions into account, a centralized system may allocate different levels of public goods to different districts financed by general taxation as well as sub-federal governments can. But unlike a decentralized decision-making process this centralized provision accompanied by decentralized administration can internalize cross-border externalities. Therefore, decentralization of competencies cannot be explained by such normative arguments. It must be driven by political economy considerations. In their framework, locally provided public goods are selected by locally elected representatives. They therefore have incentives to equate the marginal benefits from the public good with the marginal costs of public funds. In a centralized system, the level of local public goods is decided by the federal legislature consisting of elected representatives from each district. This leads to a common pool problem of the public budget: Each representative fully internalizes the benefit of the public good provided to his own district, but as financing is shared through general taxes he internalizes only a fraction of the marginal costs of public funds. Concentration of benefits and dispersion of costs lead to an overspending problem.<sup>2</sup> Thus, the constitutional decision for or against centralizing public goods entails a trade-off between the benefits of internalizing regional externalities and the costs of a common pool problem that can best be solved by fiscal federalism.

Following WEINGAST, SHEPSLE and JOHNSON (1981), state and local policymakers have an incentive to centralize government activities in order to provide their constituency with geographically targeted public goods financing them nationally with general taxes. The common-pool problem is aggravated by pork-barrel politics which can be achieved by vote trading between policymakers of different jurisdictions ('I'll scratch your back, you'll scratch mine').<sup>3</sup> Although federalist systems are desirable, they are therefore inherently unstable and

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<sup>1</sup> The literature on the normative theory of fiscal federalism is large and still expanding. A brief summary of the basic arguments is provided by FELD and SCHNEIDER (2001) while the classic articles on fiscal federalism are collected in OATES (1998).

<sup>2</sup> In a similar way, PERSSON and TABELLINI (1994) use a political economy analysis to show the importance of decentralization in restricting government discretion to expand the public sector. For an analysis of this common pool problem see the analysis of PERSSON and TABELLINI (2000), Chap. 7.

<sup>3</sup> INMAN and RUBINFELD (1997) point to empirical evidence for the U.S. showing that legislatures usually favor the high demanders of public goods under such a rule of universalism.

subject to secular trends towards centralization. This point is already mentioned by RIKER (1964) and is empirically illustrated by VAUBEL (1994). BRENNAN and BUCHANAN (1980) argue that the mentioned incentives for collusive agreements among politicians at the sub-federal level weaken the competitive pressure of fiscal federalism and accordingly represent a major problem of a federalist constitution.

Nevertheless, little attention is given to the positive question of how different degrees of government centralization can be explained. Why do we observe different degrees of centralization in government activities? WALLIS and OATES (1988) explore the process of government centralization for U.S. state and local governments from 1902 to 1982. They investigate various normative hypotheses concerning fiscal federalism but do not include a political economy explanation of centralization. VAUBEL (1996) analyzes the impact of legal and constitutional restrictions on government centralization for a cross-section of about 50 countries in the early nineties and finds that the independence of constitutional (supreme) courts and their age significantly reduces centralization. BLANKART (2000) argues in a comparative study of Germany and Switzerland that the federal tax power is decisive for the unequal process of government centralization in these two countries. He also discusses to what extent institutional differences between both countries, for example the extent of direct democracy, may shape the different centralization outcomes. He does however not provide any econometric evidence.

In a convincing study, PANIZZA (1999) presents evidence that in about 60 countries the level of democracy is associated with less centralized government activity.<sup>4</sup> The findings are in line with ALESINA and SPOLAORE (1997) who theoretically show that democratization is positively associated with the creation of countries. However, the democracy index used by PANIZZA is not sufficiently differentiated and does not help to distinguish the impact of specific democratic instruments from each other. Moreover, these results do not appear to be terribly robust for different points in time and different specifications. In a further study, BAKER (2000) takes a top-down perspective on centralization by having a look at the impact of central authorities' veto power. According to his results of a cross section of U.S. states in 1987, governors in the states use enhanced veto authority to centralize local spending responsibilities to the state level.

The purpose of this paper is to examine different degrees of centralization by political economy considerations. In contrast to existing studies, our focus is on the relationship between fiscal referendums and the degree of budget centralization. If direct democratic deci-

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<sup>4</sup> For an earlier study along these lines see POMMERHNE and KIRCHGÄSSNER (1976).

sion-making procedures, like referendums and initiatives, are used, an overspending problem at the central level is less likely because vote trading is less probable. Citizens who decide on the level of public goods in a referendum consider the total social costs of public funds and not only a fraction of it, because citizens from the whole polity decide on spending issues and not only those from a single district. The citizens from the districts that benefit each from locally concentrated public services can however not engage in region-wide vote trading with other districts because of bargaining costs in large groups.

There is however an additional argument. In a citizen-candidate voting model, REDOANO and SCHARF (2000) analyze policy centralization among two heterogeneous regions. They argue that, even if centralization is preferable to internalize cross-border spillovers, a referendum may prevent centralization from occurring. In the presence of a referendum, government policies are not harmonized whenever preferences for public goods' provision differ sufficiently among both regions. The pivotal voter in the jurisdiction that gains from benefit spillovers will not accept the centralization proposal in the referendum. Delegating decision-making power to elected representatives however helps the regions to obtain centralization because delegating the harmonization choice commits the pro-centralization jurisdiction to motivate the other jurisdiction to cooperate.

We test the hypothesis that referendums lead to less centralization with panel data from the 26 Swiss cantons from 1980 to 1998 with an econometric model capturing federalist organization and including standard controls. Our empirical investigation supports the view that popular referendums restrict government centralization. We find that budget referendums are associated with a significantly lower level of spending and revenue centralization. This does not only hold for total spending and revenue, but also for spending, revenue and tax structure.

Our paper thus also contributes to the empirical literature on the political economy of direct legislation. Several studies have investigated the effect of direct democratic institutions on the performance of governments (see the reviews by FELD and KIRCHGÄSSNER, 2000 and KIRCHGÄSSNER, FELD and SAVIOZ, 1999). A common finding is that institutions of direct democracy matter for government behavior. But to our knowledge, there is no empirical study investigating the effect of budget referendums on government centralization.

The paper is organized as follows: In Section II, we summarize the model of REDOANO and SCHARF (2000) on the impact of referendums on government centralization and adapt it by including an already existing central legislature. In Section III we present some anecdotal evidence how referendums reduce the extent of centralization. In Section IV, styl-

ized facts of Swiss institutions are summarized to motivate the empirical analysis. The empirical investigation appears in Section V followed by a discussion of the results in Section VI. We offer some concluding remarks in Section VII.

## II. The Stability of (De-)Centralization: A Theoretical Framework

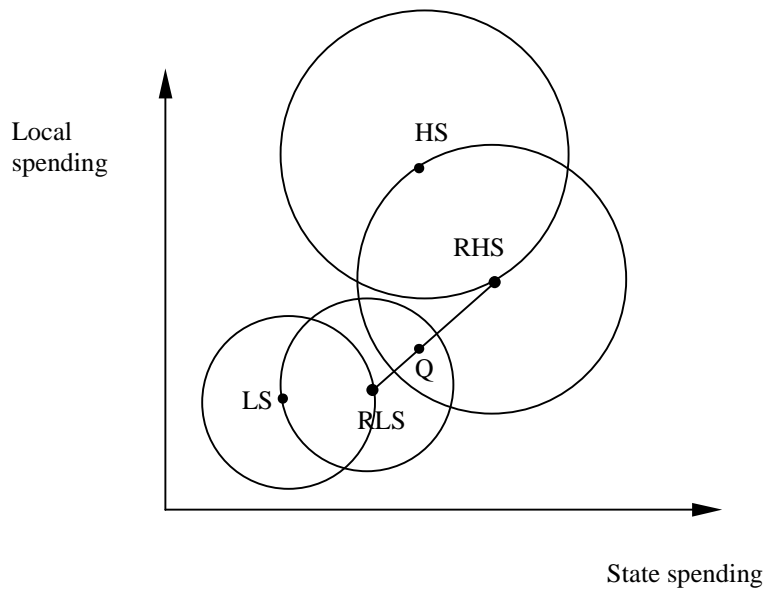
To show the theoretical effect of budget referendums in a similar setting as REDOANO and SCHARF (RS subsequently), we use a simple spatial voting model adapted from MOSER (1996), FELD (1997) and HUG and TSEBELIS (2001) as a working horse. The basic idea is to show the effect of budget referendums on government centralization considering that state decision-makers want to centralize government activities more than the median voter of the aggregate of two heterogeneous regions, while the median voter of one of the regions prefers a higher level of public goods than the median voter in the other region.

Following RS, we consider two local jurisdictions with identical population sizes. Within each jurisdiction, individual income levels are assumed to be identical. Individuals in each jurisdiction consume a private and a public good, the latter being financed exclusively by a proportional income tax imposing a balanced budget requirement on both local jurisdictions. Both jurisdictions have different preferences regarding consumption of private and public goods. This preference heterogeneity is represented in *Figure 1* in a two-dimensional policy space where decision-makers are assumed to choose a public spending project (and its financing) on the state or on the local governmental level. Suppose that state spending is represented on the  $x$ -axis and local spending on the  $y$ -axis. All political actors are assumed to have Euclidean preferences with respect to expenditures  $E$ . The preference of a political actor  $i$  can be represented by the utility function  $V_i(\cdot)$  defined over  $E$ :

$$(1) \quad V_i = -(\hat{E}_i - E)^2.$$

The most preferred point by a political actor is called his ideal point,  $\hat{E}_i$ , which has the following property:  $V_i(\hat{E}_i) > V_i(E)$ ,  $\forall E \neq \hat{E}_i$ . Thus, state and local decision-makers each have ideal points in the space ( $LS$  and  $HS$ ) which represent their preferences towards the allocation between state and local spending (or revenue). All political actors are assumed to be fully informed about the preferences of others and the structure of the game, and to prefer their decisions not to be revised by others. On the basis of these assumptions, the concept of sub-game perfect equilibrium is used providing a unique outcome for every budget game if players do not prefer weakly dominated strategies, given the preferences of the actors, their

constitutionally assigned decision-making power and the sequence of the decision making process.



*Figure 1: The impact of referendums on the degree of centralization*

The ideal points of policymakers in *Figure 1* are associated with indifference circles beyond which single actors would not approve any decision. We assume the basic situation of two local jurisdictions that characterizes the RS model to be most easily represented by four players. Consider first the situation described by RS for two heterogeneous jurisdictions that are linked to each other by interjurisdictional externalities. *Point LS* is the ideal point of the median voter of the jurisdiction with low level preferences of the state and local public goods. *Point HS* is supposed to represent the preferences of the median voter in the jurisdiction with the high level preference of state and local public goods with a slightly stronger taste for local spending. Decentralized provision of the public good would imply different income tax rates in accordance to the differences in spending levels. Centralization between both jurisdictions implies that only one harmonized income tax rate is applied to the individuals in both regions in order to finance a uniform level of the public good for both regions.

Under direct democracy, voters in both regions have to decide on the degree of centralization or coordination in a referendum in order to internalize interjurisdictional externalities. RS model this scenario as a three-stage game. Voters decide on centralization first, elect their candidates in the second stage, and these representatives select policies in the third stage. The spending preferences of the elected officials in the high spending preference jurisdiction are depicted by *point RHS* in *Figure 1*, while those of the elected officials in the low spending



preference jurisdiction are depicted by *point RLS*. To illustrate the difference between direct and representative democracy, we model the preferences of the elected representatives and the median voters of both jurisdictions to be different from each other.

In the illustration drawn in *Figure 1*, the preferences of the median voters of both jurisdictions are sufficiently heterogeneous as to prevent centralization. This heterogeneity of preferences prevents a coordination or centralization of public good provision, and is graphically represented by the fact that the indifference circles of the median voters of both jurisdictions do not cross or touch each other. While the median voter represented by *point HS* prefers a higher level of local spending, the median voter represented by *point LS* prefers a lower level of local public spending. In a referendum democracy, the low preference region will not agree on any deviation of local spending beyond the circle drawn around *point LS* if it is fully autonomous over local spending under direct democracy. Voters in this jurisdiction will always vote against any such centralization effort for single policies as long as they can benefit from spillover effects. The low preference jurisdiction can gain from such a non-cooperative situation by a free ride on services from the other jurisdiction. On the other hand, the median voter in the high spending preference jurisdiction will not approve any spending levels beyond the indifference circle drawn around *HS*, so that they cannot agree to lower spending levels approaching the ideal point of the low spending region.

Under representative democracy, centralization does not trigger a referendum, but is decided by the elected officials. *RS* show that the jurisdiction with a high preference for local spending can successfully commit to the jurisdiction with a low preference for local spending by electing a candidate with a lower preference for local spending than the median voter of that jurisdiction (*RHS*). Since the indifference circle of that candidate is just crossing the bliss point of the median voter in the high spending preference jurisdiction *HS*, the candidate wins the election. The high preference jurisdiction has an interest in centralization because interregional externalities makes the citizens worse off. Due to these externalities, the low spending preference jurisdiction can free ride such that citizens in the high spending preference jurisdiction incur a loss either because of congestion or inefficiently low provision of public services. The election of a lower local spending preference representative by the constituency of the high spending preference jurisdiction serves as a commitment device that the spending preference of the low preference jurisdiction is sufficiently considered.

Similarly, the low preference jurisdiction can credibly commit itself by electing a candidate with higher spending preferences (*RLS*) signaling thus the competing region that its higher public services will not be exploited by free riding. This candidate wins the election in

the low spending preference jurisdiction because the indifference circle drawn around *RLS* crosses the ideal point of the median voter. The latter region has an incentive to commit to higher spending levels because regional or fiscal externalities make it worse off as well if they are not internalized. These externalities induce the region preferring high local spending to provide public services on a too low level, perhaps even not at all. Like in a prisoners' dilemma situation both regions are worse off in this uncooperative equilibrium. The low local spending preference jurisdiction will suffer from the fact that the high spending region reduces its local spending level. Therefore it will take the opportunity to commit to cooperation by delegating decision-making power to a candidate who prefers higher spending.

Having both candidates negotiate the extent of centralization and the level of spending at the local level leads to a policy outcome somewhere in the overlapped lens, say *Q*. Both officials decide to increase state spending and agree to harmonize their local spending. Without a referendum, this bargaining outcome becomes policy. In the presence of a referendum, the median voter of the low preference jurisdiction would not accept such a proposal, but only adopt combinations of state and local spending in the lens in the south-west of *Q*, that is defined by the lines crossing points *LS* and *RLS*. The median voter of the high preference jurisdiction would only accept combinations of state and local spending in the lens in the north-west of *Q*, that is defined by the lines crossing points *HS* and *RHS*. Since these areas do not touch or cross each other, no centralization takes place under direct democracy.

These arguments can be interpreted as the interaction of two local jurisdictions which create a new state authority by centralization. In the RS model, there are no political economy problems in the sense discussed by BESLEY and COATE (1999). However, higher level authorities usually exist already and have a vested interest in deriving additional policy responsibilities. Their interest for centralization can be deducted from the common pool problem emerging from centralization. Representatives at the central level are elected by each district in a polity. In order to get benefits for their districts, each representative engages in a vote trading exercise by promising the support of projects in other districts if the projects in his/her district are supported by the other representatives. In this process, each representative fully internalizes the benefit of its own public good, but as financing is shared through general taxes it internalizes only a fraction of the marginal costs of public funds. Concentration of benefits and dispersion of costs lead to an overspending problem.

To illustrate such a situation, suppose that centralization already occurred and the current combination of state and local spending is depicted by *point Q* in *Figure 1*, now the ideal point of the state authority. The deviation of *Q* from *LS* and *HS* can be explained by vote

trading of locally elected legislators. If the state authority has decision-making power on centralization, it will accept only proposals that are skewed towards state spending responsibilities. The state authority will also veto any deviation from point  $Q$ , thus preventing decentralization. If, however, a binding and required referendum on this combination were possible, it could change the outcome to a situation with a reduced share of state spending, as  $Q$  cannot be attained under direct democracy. These arguments lead us to the following empirically testable hypothesis:

*Hypothesis 1:* The degree of centralization is lower under a regime of direct democracy, where a budget referendum is possible, than in a regime where no budget referendum is available and budgetary decisions are only taken by pure representative democracy.

### **III. Anecdotal Evidence**

As recent referendums on European integration in Ireland and Denmark have shown, centralization is not easily accomplished in the case it has to be decided in a referendum. In a referendum on joining the European Monetary Union on September 28, 2000, the Danish people decided by a majority of 53.1 percent not to become a member of EMU although it is a widely held belief that the de facto independence of Danish monetary policy is very little. Danish voters obviously opposed a further centralization of competencies to the EU level. Similarly, the Irish people did not adopt the Nice Treaty in a referendum on June 7, 2001 by a majority of 53.9 percent. They may not have accepted that the Nice Treaty reduces the decision-making power of smaller EU member states in the Council of Ministers. Perhaps they were also a bit embarrassed by the Commission's intervention in Irish fiscal policies that occurred despite the fact that Ireland has a favorable fiscal stance.

Government centralization is also of great practical relevance in Swiss politics, as two examples illustrate: the canton of Fribourg which today accounts for 242 communes wants to reduce its number of communes to 120 units by assisting communal mergers. The government officials argue that the current communal structure is inefficient since one third of the communes account for less than 1'000 inhabitants. In the sixties already the cantonal parliament of Fribourg passed a law to encourage communal mergers, if necessary by enforcement. On a referendum on May 26, 1974 voters refused this law by 60 percent of the votes. Nevertheless, once more on October 12, 1999 the cantonal government of Fribourg decided to financially subsidize communal mergers until 2004 with 4 Mio. SFr each year. After this date, mergers of small communes should be enforced. Despite this incentive, the citizens strongly oppose these plans.

The same holds for the canton of Ticino. In 1998 the cantonal government presented a report arguing that its 245 communes are too small to provide public services efficiently. According to this report, the number of communes would have to be reduced to 86 units in order to reach a so-called 'optimal' communal size. However, in a communal poll two communes (Lugaggia and Sala Capriasca) refused the merger with 4 other communes. Another example is a recent proposal on tax harmonization between all communes in the canton of Vaud. On June 10, 2001, voters refused an initiative which demanded a uniform tax rate for all 384 communes on the territory of the canton of Vaud. These examples give a first clue that the popular referendum could have some impact on restricting policy centralization among Swiss cantons.

#### **IV. Stylized Facts about Swiss Institutions**

Indeed, Switzerland provides a natural laboratory to test *Hypothesis 1*. The power of the federal government in Switzerland is very limited. Federal tasks have to be explicitly enumerated in the federal constitution. No concurrent legislation, like in Germany, exists and centralization of responsibilities has to be approved in a referendum requiring a double majority of the Swiss citizens and of the cantonal electorates. In 1998, 33 percent of total (federal, cantonal and local) spending was undertaken by the federal government, 40 percent by the cantonal level and 27 percent by the local level. There are corresponding figures for public revenue. However, the degree of spending and revenue centralization is accompanied by a respective decision-making power of the different government levels on spending and revenue policies. For example, there is no tax sharing between Swiss jurisdictions, like in Australia, Austria and Germany. Cantons and also local jurisdictions, though to a smaller extent, have discretion on personal and corporate income tax rates (FELD and SCHNEIDER, 2001). Similarly, cantons decide upon their infrastructure independently. Even social welfare is independently determined by the local and state levels.

As *Appendix B* illustrates, there is an additional variation of centralization from the local to the state level in the different Swiss cantons. For total revenue and spending, it varies from roughly 50 percent in cantons like Obwalden or Schwyz to essentially 100 percent in the canton of Basle-City. The latter is an outlier in that respect, because cantonal and local spending are not properly separated in the budget laws. The second most centralized canton is the canton of Glarus. The degree of centralization varies even more considerably for different revenue and spending categories. While the average centralization of direct taxes with the exception of inheritance taxes appears to be relatively homogeneous, average centralization of

public spending categories is considerably more heterogeneous. It ranges from 8 percent to 98 percent in the case of spending for culture and recreation, but from 51 percent to 100 percent in the case of education spending.

**Table 1: The budget referendum thresholds in Swiss Cantons**

<i>Canton</i>	<i>non-recurring expenditures<sup>b</sup></i>		<i>Recurring expenditures<sup>b</sup></i>		<i>Frey-Stutzer Index<sup>a</sup></i>
	<i>optional</i>	<i>mandatory</i>	<i>optional</i>	<i>mandatory</i>	
ZH <sup>c</sup>	2-20	20	0.2-2	2	4
BE	2		0.4		5
LU	3-25	25	specific stipulations <sup>d</sup>		4.25
UR	0.5	1	0.05	0.1	5
SZ		0.25		0.05	4.38
OW	0.5	1	0.1	0.2	5
NW	0.25	5	0.05	0.5	5
GL		0.5		0.1	4
ZG		0.5		0.05	4
FR	0.25%	1%	0.25%	1%	2
SO	1-2	2	0.1-0.2	0.2	5
BS	1		0.2		4.25
BL	0.5		0.05		4.75
SH	0.3-1	0.3	0.05-0.1	0.05	4.5
AR		5%		1%	4
AI	0.25	0.5	0.05	0.1	3
SG	3.15	15	0.3-1.5	1.5	3.25
GR	1-5	5	0.3-0.5	0.5	4
AG	3		0.3		4.5
TG	1	3	0.2	0.6	4.5
TI	0.2		0.05		2.75
VD					3
VS	0.75%		0.25%		1
NE		1.5%		1.5%	1.5
GE	0.125		0.06		1
JU	0.5%	5%	0.05%	0.5%	2.5

Source: LUTZ, G. and D. STROHMANN (1998); and FREY, B.S. A. STUTZER (2000)

<sup>a</sup> The index is constructed by the signature requirement as the number of signatures relative to the number of voters, by the legal time limit as the days within which the signatures have to be collected and by the financial threshold as the per capita spending limit allowing for referendum (the values correspond to the year 1992).

<sup>b</sup> In 1'000'000 Swiss Francs

<sup>c</sup> For an explanation of the identification codes cf. Figure 2

<sup>d</sup> In the case of recurring expenditures the total amount over all concerned budget periods is decisive.

**Figure 2: The budget referendum possibilities in Swiss Cantons**

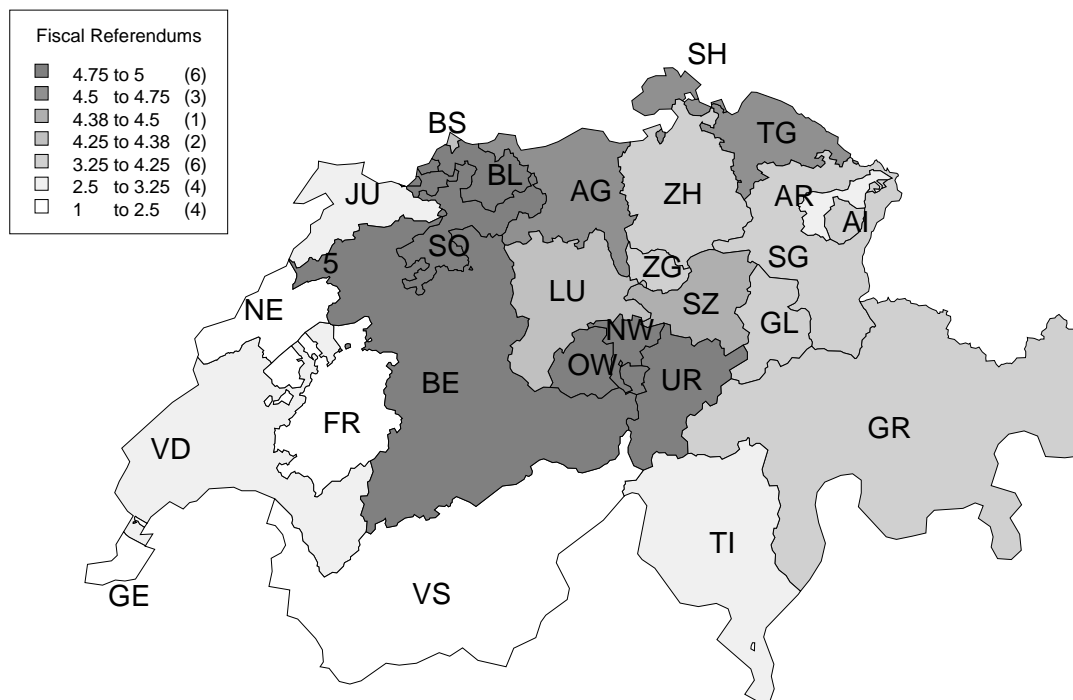


Figure 2 shows the extent of budget referendum possibilities in the 26 Swiss cantons. The identification codes stand for the following cantons: Aargau (AG), Appenzell-Innerrhoden (AI), Appenzell-Ausserrhoden (AR), Bern (BE), Basel-Landschaft (BL), Basel-Stadt (BS), Fribourg (FR), Genève (GE), Glarus (GL), Graubünden (GR), Jura (JU), Luzern (LU), Neuchâtel (NE), Nidwalden (NW), Obwalden (OW), Schaffhausen (SH), Schwyz (SZ), St.Gallen (SG), Solothurn (SO), Thurgau (TG), Ticino (TI), Uri (UR), Vaud (VD), Valais (VS), Zug (ZG), Zürich (ZH).

Switzerland's considerable autonomy at the state and local level is accompanied by a non-negligible variation of institutions of direct democracy. Most cantons have some form of semi-direct democracy with a parliamentary system with legislators elected according to a system of proportional party representation. Only two rural cantons (Appenzell-Innerrhoden (AI) and Glarus (GL), cf. *Figure 2*) take political decisions in canton meetings (Landsgemeinde). On the other hand, the cantons have different institutions of political participation rights (TRECHSEL and SERDÜLT, 1999; FELD and MATSUSAKA, 2000). Proposals can be initi-

ated by the voter initiative, and new laws passed by the legislature are, to different degrees, subject to an optional or even a mandatory popular referendum.

In the context of our analysis, the impact of budget referendums on policy decisions of sub-national governments is of interest. There exists no budget referendum on the central level, but with the exception of the canton of Vaud (VD)<sup>5</sup> all cantons know a derivative of the budget referendum. Of the remaining 25 cantons, 13 have a mandatory as well as an optional budget referendum. In seven other cantons (BE, BS, BL, AG, TI, VS, GE) only the optional budget referendum is possible, whereas in SZ, GL, ZG, AR, NE budget resolutions have to pass the mandatory, but not the optional budget referendum. The budget referendum can be differentiated according to five categories: the budget referendum for public expenditures, for public-sector bonds, for taxes, for holdings on enterprises and for purchases of real estate. In principle, there are threshold variations for non-recurring expenditures and for recurring expenditures. Five cantons (FR, AR, VS, NE, JU) determine thresholds as a percentage of last budget's expenditures. All others determine a specific amount as the decisive threshold. The number of signatures required to qualify for ballots and the time span within which the signatures have to be collected for the optional budget referendum is also very diverse among cantons. It differs from 0.49 percent of signatures from all voters in the canton of Obwalden (OW) compared to 4.28 percent of signatures in the canton of Jura (JU). The time span for collecting the signatures varies from 30 days to 90 days among cantons with an optional budget referendum.

In order to conduct an empirical analysis, we calculate an index for the extent of fiscal referendum possibilities across all Swiss cantons, similar to the one proposed by FREY and STUTZER (2000). As can be seen from *Figure 2* there is a wide cross-sectional variety in the extent of referendum possibilities for fiscal matters in Switzerland. Thus, the institutional variation on the Swiss sub-federal level provides a laboratory to investigate the impact of budget referendums on government centralization.

## V. Empirical Model

In order to test *Hypothesis 1*, saying that budget referendums are associated with a lower degree of government centralization, we use a linear model that determines the share of cantonal expenditure and revenues (structure) from cantonal and local expenditure and revenues (structure). The central level in our empirical model is therefore comprised of the can-

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<sup>5</sup> Laws that affect public spending are subject to an optional legislative referendum in the canton of Vaud (VD).

tons while the sub-central level is represented by the local jurisdictions. The model can be written as follows

$$(2) \quad ES_{it} = \alpha_1 + \beta_1 R_{it} + \gamma_1 T_{it} + \delta_1 X_{it} + \varepsilon_{1it}$$

$$(3) \quad RS_{it} = \alpha_2 + \beta_2 R_{it} + \gamma_2 T_{it} + \delta_2 X_{it} + \varepsilon_{2it}$$

where  $ES_{it}$  denotes the share of real cantonal expenditure (structure) in percent of total state and local expenditure in equation (2) and  $RS_{it}$  represents the respective real revenues (structure) in equation (3).  $R_{it}$  is the index for the extent of cantonal budget referendums,  $T_{it}$  is a vector of different control variables measuring the extent of fiscal federalism, and  $X_{it}$  is a vector of economic, demographic and political control variables. In addition, time fixed effects are included in all equations.  $\alpha$ ,  $\beta$ ,  $\gamma$ ,  $\delta$  are vector valued coefficients to be estimated while  $\varepsilon$  represents an error term (cf. *Appendix A* for a definition of all variables). The unit of observation is the cantonal level. We estimate the model using annual data over the period 1980 to 1998 deflated to the year 1980. The subscript  $i = 1, \dots, 26$  indicates cantons and  $t = 1980, \dots, 1998$  indexes years (cf. *Appendix B* for summary statistics).

As stated by OATES (1972) and PANIZZA (1999) the quantification of government centralization is not an easy task. Cross-country comparisons of expenditure and revenue ratios on the federal level could be an inaccurate measure of policy centralization due to the following problems: (i) Different numbers of levels of sub-federal governments should be weighted differently. (ii) Local spending and revenues do not necessarily reflect autonomy in spending and revenue decisions. (iii) The existence of inter-governmental grants has an important effect on the incentive structure of local decision-makers. Fortunately, our data base accounts for these problems and therefore has a major advantage compared to cross-country comparisons. First, all governments in our regression have only one sub-ordinate level. Second, it may well be that centralization of public finances does not exactly describe local autonomy and it would be better to have an indicator of constitutional autonomy. However, the decision-making power granted to local jurisdictions by the cantonal constitution or the laws is difficult to measure. In addition, Switzerland is one of the countries where the principle of institutional congruency holds, that is where people paying and consuming public goods are also those who decide upon it (SCHALTEGGER and FREY, 2001). The Swiss data on centralization of public finances should thus be a relatively good proxy for centralization of competencies. Third, our data base allows to consider the impact of inter-governmental grants



in our analysis. Furthermore, a common problem of cross-country analyses stems from the fact that social security programs are included in data for the total government but sometimes not in data for the central government due to off-budget activities. Therefore, cross-country centralization ratios are likely to be underestimated for those countries which have sizeable off-budget activities. In our data base, the financing of national social security and national defense are excluded for all governments. Thus, all in all we believe to have a useful proxy reflecting government centralization.<sup>6</sup>

To consider the institutional impact of budget referendums on government centralization we use the index of cantonal *budget referendums*  $R_{it}$ , which is proposed by FREY and STUTZER (2000). According to *Hypothesis 1*, this variable should exhibit a negative sign.

The theoretical model implies that the expenditure (revenue) structure is a function of some internal determinants of a jurisdiction. First, the extent of fiscal federalism in the different jurisdictions, measured by the vector  $T_{it}$ , plays an important role. According to the model in *Section 2*, centralization depends on preference heterogeneity at the local level, the extent of fiscal externalities due to tax competition and economies of scale in the provision of government services. We capture *homogeneity* in a canton by solely relying on income differences. The spread of personal income is measured by the ratio of real taxable income of the median taxpayer to that of the average taxpayer. The stronger the homogeneity of a canton, the more reasonable it is to centralize government policies because of low preference costs. The closer the ideal points of the median voters in different local jurisdictions, the more easily they can agree upon a uniform centralized provision of a public good.

A concurrent hypothesis with respect to that variable can be found in the normative literature on fiscal federalism according to which decentralized income redistribution is not possible due to income stratification (FELD and SCHNEIDER, 2001). The more uneven income is distributed in a jurisdiction, the higher the necessity for a centralization of income redistribution activities. The higher the ratio of median to mean income, the more even the income distribution in a canton. Following the normative theory of fiscal federalism, higher income differences are supposed to increase the pressure for centralization in particular with respect to spending and revenue components which are strongly aimed at redistributing income, like

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<sup>6</sup> An additional argument that is worth mentioning is concerned with a possible centralization to the federal level. Indeed, economic and constitutional incentives to centralize government activities might also lead to a centralization from the cantonal to the federal level and not only from the local to the cantonal level. This effect is not captured by the data used in this paper. It would be necessary to use cross country data that have their particular shortcomings as well, as mentioned above.

e.g. (progressive) personal income taxes or welfare spending. The homogeneity variable thus helps to find out the importance of both hypotheses. It is supposed to have a negative sign, if the traditional public finance hypothesis on the impossibility of decentralized redistribution holds. If the political economy argument holds, the homogeneity variable should have a positive sign.

Moreover, cantonal governments take fiscal policies of their neighbors into account when making own decisions. This mimicking behavior of incumbents in a federalist system may either be the result of a tax competition game between the different jurisdictions, and thus their response to differential mobility of production factors (WILDASIN and WILSON, 2001). It may as well be a response of electoral voting behavior since voters make inter-jurisdictional comparisons when making own decisions. Consequently, incumbents are engaged in a kind of yardstick competition (BESLEY and CASE, 1995). The extent of *tax* or *yardstick competition* is taken into consideration by a weighted average of the tax burdens of all other cantons for the highest income class. As weight, the inverse of geographical distance is used.

Three other control variables for the extent of fiscal federalism are included. *Population* and *ratio of urban population* capture economies of scale in consumption of publicly provided goods. Following the argument by BRENNAN and BUCHANAN (1980), *lump-sum grants* from the central level constitute an important resource for cantonal and local governments and therefore change the incentive structure of fiscal federalism.

In addition to variables of fiscal federalism, we include a vector of economic, demographic and political variables,  $X_{it}$ . The political control variables have to capture to what extent the common pool argument might influence centralization. ROUBINI and SACHS (1989) argue that the broader a coalition the weaker its budgetary discipline due to the common pool problem of the public budget. Broad-based coalition governments on the cantonal level could have a tendency towards policy centralization in order to satisfy a broader range of different constituencies. Therefore, a *coalition* variable is included, measured by the number of parties in the cantonal cabinets. The severance of the common pool problem is mitigated by fiscal federalism. The variable *fragmentation* (number of communes) incorporates the effect of the number of local agents in explaining government centralization. The more local agents have to agree on collusive agreements for policy centralization the less stable this agreement should be. Thus, we expect a negative impact of fragmentation on policy centralization.

The remaining variables included in the model are standard controls. Following WAGNER'S Law (1892) real *national income* per capita is used to quantify an income effect of the demand for public goods. The different cultural background is considered by adding a dummy-variable with respect to different *language areas*. With regard to different political preferences we include the variable *ideology* that consists of an index within the range of 1 for right wing dominated and 5 for left-wing dominated executive authority. Including these two variables is important, because they indicate the preferences for government centralization in the different Swiss cantons. It may be that the degree of centralization as well as the inclusion of direct democratic decision-making rights in the cantonal constitutions are both determined by a third variable. This third variable might be fiscal preferences of the citizens in the different jurisdictions. In a recent paper, PUJOL and WEBER (2000) present evidence for Switzerland that fiscal preferences measured by budget referendums at the federal level are nearly exclusively explained by the differences between the Swiss language areas. In addition, partisan considerations may play a role. Therefore, we have to include both variables in the model. Finally, we include a dummy variable for the canton of Basle-City in the model in order to consider the fact that state and local budgets are not properly distinguished in this canton.

In the spirit of other empirical investigations (e.g. FELD and KIRCHGÄSSNER, 2001) our empirical analysis is performed using a pooled cross-sectional time-series (TSCS) model including time fixed effects. Although (cross section or two way) fixed effects models may be preferable as they provide useful information about the longitudinal relationship, they do not seem to be appropriate in our case. They leave the explanation of cross-canton differences to the cantonal intercepts without any theoretical foundations and therefore capture a major part of the effect of budget referendums since institutions do not or only slightly fluctuate over time. Thus, pooled models have to be applied with care but can be regarded as reasonable in the field of institutionally oriented comparative political economy.

The estimation of equations of the spending and revenue structure raises some econometric issues. Since the centralization ratios vary between zero and one and are therefore censored, OLS estimates would be biased. To take a possible bias into account, we use a Tobit model with censored dependent variables. However, the assumption of normally distributed residuals is crucial for the consistency of the Tobit estimates. As can be seen by the Jarque-Bera test in *Tables 2 to 5* this condition is violated with respect to some estimates. Thus, we conduct an analysis of outliers and control for the outliers by including dummy variables for these observations. Comparing the estimation results with and without controlling for outliers indicates the extent of robustness of the estimates. In addition, panel data of-

ten exhibit cross-section heteroscedasticity and serial correlation. Autocorrelation of the error terms does however not affect the consistency of the estimated parameters, but only the consistency of the estimated standard errors. Thus, we use a GMM method in order to compute the  $z$ - or  $t$ -statistics.

Sometimes, budget referendums are seen as being endogenously influenced by budgetary parameters. We consider budget referendums as exogenous since they are characterized by much stability over time. Finally, problems of endogeneity could be present for some other regressors, too. To tackle this problem a Hausman-Test was performed. First, we regressed *grants* and *tax competition* on their lagged values and the other regressors to obtain the residuals. Then, the residuals are included in the original estimate. As the residuals are not found to be significant in our regression we can be confident of their exogeneity.

## **VI. Results**

In *Tables 2 to 5*, we report the results of the econometric model. We first present evidence on total spending and revenue as well as tax revenue. Second, we extend the analysis to spending and revenue structure and finally we perform sensitivity analyses by including dummy variables for university cantons and town meeting cantons. Note that the endogenous variables, the ratios of cantonal to the sum of cantonal and local budget outcomes, take on values between zero and one.

The regressions in *Tables 2 to 5* indicate that the model performs relatively well in statistical terms. Most variables are highly significant and their impact is robust to an analysis of outliers. The Jarque-Bera test statistics in *Table 2* indicate that the hypothesis of normality can be rejected for total spending, total revenue and tax revenue. Since normal distribution of the residuals is essential for the consistency of the estimated parameters in the Tobit model, we concentrate our discussion of the results in all tables on the Tobit model in which outliers are successfully controlled for. It is interesting to note that, in addition to the canton of Basle-City, the cantons of Basle-Country, Uri and Glarus can be frequently identified as outliers. Basle-Country and Glarus are known for traditionally high levels of centralization from the local to the cantonal levels. Uri obtains high amounts of grants from the federal government that the cantonal government administers.

**Table 2: Tobit estimates for government centralization, general expenditure, revenue and tax revenue, 26 Swiss cantons, 1980-1998**

Variable	Expenditure I	Expenditure II	Revenue I	Revenue II	Tax revenue I	Tax revenue II
Budget referendum	-0.013*** (-3.424)	-0.014*** (-5.251)	-0.013*** (-3.563)	-0.014*** (-5.515)	-0.019*** (-4.807)	-0.013*** (-6.308)
Homogeneity	0.027 (0.549)	-0.041 (-1.128)	0.014 (0.300)	-0.052 (-1.525)	0.137*** (2.655)	-0.003 (-0.112)
Tax competition	-0.321*** (-5.340)	-0.176*** (-3.878)	-0.322*** (-5.597)	-0.181*** (-4.227)	-0.691*** (-10.969)	-0.349*** (-9.761)
Lump-sum grants <sup>▼</sup>	0.079* (1.722)	0.003 (0.115)	0.100** (2.160)	0.022 (0.703)	-0.160*** (-3.323)	-0.247*** (-9.372)
Ratio of urban population	-0.156*** (-6.139)	-0.122*** (-5.643)	-0.171*** (-7.041)	-0.138*** (-6.765)	-0.063** (-2.385)	0.129*** (7.616)
Population <sup>▲</sup>	0.158 (0.671)	0.278 (1.601)	0.188 (0.837)	0.306* (1.865)	-0.441* (-1.787)	-0.550*** (-4.022)
Coalition	0.007 (1.462)	-0.016*** (-4.061)	0.006 (1.332)	-0.016*** (-4.372)	0.040*** (7.975)	-0.005 (-1.499)
Fragmentation <sup>▼</sup>	-0.377*** (-6.783)	-0.202*** (-4.897)	-0.394*** (-7.401)	-0.224*** (-5.745)	-0.377*** (-6.464)	-0.079** (-2.427)
Ideology	-0.031*** (-5.117)	-0.017*** (-3.885)	-0.031*** (-5.307)	-0.016*** (-4.372)	-0.045*** (-7.121)	-0.031*** (-8.855)
Language	-0.044*** (-2.965)	-0.073*** (-6.847)	-0.047*** (-3.336)	-0.076*** (-7.501)	0.012 (0.755)	-0.041*** (-4.815)
Cantonal income <sup>▼</sup>	-0.208 (-0.201)	0.002** (2.490)	-0.476 (-0.481)	1.548** (2.164)	3.558*** (3.283)	3.078*** (5.161)
Dummy Basel-Stadt	0.442*** (18.109)	0.454*** (24.922)	0.454*** (19.457)	0.466*** (27.096)	0.401*** (15.682)	0.365*** (25.420)
Dummy Basel-Land		0.171*** (12.257)		0.166*** (12.603)		0.106*** (9.646)
Dummy Uri		0.214*** (16.086)		0.207*** (16.488)		0.206*** (19.710)
Dummy Glarus		0.122*** (16.086)		0.119*** (8.245)		0.361*** (30.048)
Observations	494	494	494	494	494	494
Log likelihood	613.583	782.001	635.558	810.510	590.649	900.379
Jarque Bera	19.805***	0.752	19.945***	0.701	12.842***	3.890

*Note:*

Government centralization stands for the state share of state and local expenditures. z-values are given in parentheses. The computed standard errors have been corrected for Newey West's heteroskedasticity and serial correlation consistent covariance matrix. All regressions contain 19 year-dummies whose coefficients are not reported. \*\*\*, \*\* and \* indicate significance at 1%, 5% and 10% levels, respectively. ▼, \*, ▲: scaled by 10<sup>3</sup>, 10<sup>5</sup>, 10<sup>7</sup>, respectively for readability. The Jarque-Bera test statistic is a test on the null hypothesis of normality of the residuals.

**Table 3: Tobit estimates for government centralization, expenditure structure, 26 Swiss cantons, 1980-1998**

Variable	Administration	Security	Culture and recreation	Health	Welfare	Education	Finance	Traffic	Economy	Environment
Budget referendum	0.003 (0.809)	-0.000 (-0.989)	0.003 (0.581)	0.003 (0.365)	0.015*** (3.042)	-0.018*** (-4.372)	0.002 (0.227)	0.010** (2.109)	-0.006 (-1.188)	-0.011*** (-2.918)
Homogeneity	-0.064 (-1.117)	0.033 (0.692)	-0.199*** (-2.898)	0.138 (1.317)	0.044 (0.677)	0.190*** (3.437)	-0.318*** (-3.502)	-0.114* (-1.919)	-0.269*** (-4.079)	0.045 (0.881)
Tax competition	-0.308*** (-4.435)	0.026 (0.455)	-0.009 (-0.104)	-1.398*** (-9.867)	-0.142* (-1.797)	-0.388*** (-4.543)	0.994*** (8.879)	-0.319*** (-3.862)	0.342*** (3.605)	-0.258*** (-3.435)
Lump-sum grants <sup>▼</sup>	0.135*** (2.604)	0.125*** (2.805)	0.456*** (7.303)	-0.300*** (-3.000)	0.014 (0.228)	0.148*** (2.707)	-0.251*** (-2.913)	-0.094* (-1.691)	0.166** (2.027)	0.528*** (8.995)
Ratio of urban population	-0.227*** (-8.252)	-0.080*** (-3.280)	-0.447*** (-12.051)	-1.060*** (-15.939)	0.033 (0.976)	-0.012 (-0.379)	0.348*** (7.346)	-0.195*** (-5.611)	0.163*** (4.272)	0.106** (2.556)
Population <sup>▲</sup>	1.011*** (4.585)	-0.640*** (-2.817)	0.651** (1.976)	-0.373 (-0.670)	-1.161*** (-3.755)	1.091*** (3.801)	-2.131*** (-4.885)	0.283 (1.009)	-0.845** (-2.324)	-1.251*** (-4.376)
Coalition	-0.018*** (-3.103)	-0.007 (-1.571)	0.043*** (6.061)	-0.010 (-0.983)	-0.075*** (-11.830)	0.028*** (4.966)	-0.050*** (-5.521)	-0.002 (-0.362)	-0.025*** (-3.478)	0.018*** (2.829)
Fragmentation <sup>▼</sup>	-0.511*** (-9.752)	-0.231*** (-4.299)	0.041 (0.546)	-1.511*** (-12.211)	0.265*** (3.635)	0.378*** (5.029)	0.156 (1.507)	-0.725*** (-10.035)	0.175** (1.997)	0.322*** (4.796)
Ideology	-0.022*** (-3.461)	-0.030*** (-5.106)	0.019** (2.214)	-0.157*** (-10.959)	-0.012 (-1.460)	0.028*** (4.966)	-0.050*** (-5.521)	-0.002 (-0.362)	0.013 (1.392)	0.008 (1.067)
Language	-0.063*** (-4.641)	-0.048*** (-3.340)	-0.043** (-2.062)	0.053 (1.536)	-0.217*** (-11.157)	-0.100*** (-5.504)	-0.062** (-2.261)	-0.101*** (-5.648)	-0.059*** (-2.653)	0.051*** (2.790)
Cantonal income <sup>▼</sup>	1.620 (1.422)	-1.261 (-1.262)	-1.622 (-1.149)	0.0177*** (8.021)	1.579 (1.164)	0.606 (0.496)	0.206 (0.107)	-1.441 (-1.142)	0.013 (0.006)	-3.861*** (-2.936)
Dummy Basel-Stadt	0.611*** (29.791)	0.319*** (13.540)	0.966*** (27.790)	0.596*** (10.445)	0.391*** (12.202)	0.422*** (14.497)	0.099** (2.189)	0.391*** (13.388)	0.012 (0.275)	0.666*** (20.460)
Controlling outliers	No	No	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
Observations	494	494	494	494	494	494	494	494	494	494
Log likelihood	554.650	630.852	454.383	253.968	479.685	558.819	312.237	532.376	481.328	592.426
Jarque-Bera	0.786	4.059	4.685*	1.969	1.986	3.674	3.633	4.114	3.686	4.551

*Note:*

Government centralization stands for the state share of state and local revenues. z-values are given in parentheses. All regressions contain 19 year-dummies whose coefficients are not reported. \*\*\*, \*\* and \* indicate significance at 1%, 5% and 10% levels, respectively. ▼, ▲, \*: scaled by 10<sup>3</sup>, 10<sup>5</sup>, 10<sup>7</sup>, respectively for readability. The Jarque-Bera test statistic is a test on the null hypothesis of normality of the residuals.

<b>Table 4: Tobit estimates for government centralization, revenue structure, 26 Swiss cantons, 1980-1998</b>						
Variable	User Charges	Tax on income and property	Tax on property	Tax on income	Tax on profits	Tax on capital
Budget referendum	-0.023*** (-4.201)	-0.013*** (-6.009)	-0.016*** (-9.643)	-0.017*** (-10.905)	-0.010*** (-4.148)	-0.033*** (-8.156)
Homogeneity	0.106 (1.594)	-0.009 (-0.293)	-0.011 (-0.493)	0.003 (0.147)	0.016 (0.532)	0.221*** (4.608)
Tax competition	-0.342*** (-2.972)	-0.377*** (-10.206)	-0.548*** (-19.341)	-0.534*** (-20.601)	-0.496*** (-10.091)	-0.741*** (-9.709)
Lump-sum grants <sup>▼</sup>	-0.488*** (-5.613)	-0.254*** (-9.339)	-0.109*** (-5.171)	-0.181*** (-9.565)	-0.155*** (-5.539)	-0.211*** (-4.967)
Ratio of urban population	0.575*** (13.384)	0.135*** (7.669)	0.162*** (11.821)	0.168*** (13.710)	0.253*** (11.817)	-0.276*** (-7.253)
Population <sup>▲</sup>	-2.971*** (-8.311)	-0.481*** (-3.411)	-0.303** (-2.766)	-0.380*** (-3.832)	-0.831*** (-5.326)	-4.841*** (10.141)
Coalition	0.038*** (4.527)	-0.006* (-1.930)	-0.011*** (-4.535)	-0.011*** (-4.899)	-0.006* (-1.916)	0.074*** (11.991)
Fragmentation <sup>▼</sup>	-0.488*** (-5.613)	-0.089*** (-2.657)	0.001 (0.044)	-0.010 (-0.443)	-0.161*** (-4.752)	-0.982*** (-11.012)
Ideology	-0.125*** (-13.265)	-0.031*** (-8.639)	-0.023*** (-8.136)	-0.021*** (-8.160)	-0.049*** (-10.222)	-0.022*** (-3.590)
Language	0.054** (2.296)	-0.042*** (-4.818)	-0.042*** (-6.254)	-0.041*** (-6.834)	-0.061*** (-6.810)	0.007 (0.379)
Cantonal income <sup>▼</sup>	0.004** (2.500)	0.003*** (5.314)	3.482*** (7.352)	0.003*** (7.888)	0.002*** (2.835)	0.010*** (9.392)
Dummy Basel-Stadt	0.111*** (3.145)	0.382*** (25.472)	0.443*** (38.661)	0.369*** (35.508)	0.370*** (23.403)	0.461*** (21.019)
Controlling outliers	Yes	Yes	Yes	Yes	Yes	Yes
Observations	494	494	494	494	494	494
Log likelihood	482.601	879.772	980.379	1062.932	871.415	613.876
Jarque-Bera	1.105	2.045	2.271	2.389	2.392	4.232

*Note:*  
 Government centralization stands for the state share of state and local revenues. z-values are given in parentheses. All regressions contain 19 year-dummies whose coefficients are not reported. \*\*\*,\*\* and \* indicate significance at 1%, 5% and 10% levels, respectively. ▼, ▲, ▲: scaled by 10<sup>3</sup>, 10<sup>5</sup>, 10<sup>7</sup>, respectively for readability. The Jarque-Bera test statistic is a test on the null hypothesis of normality of the residuals.

**Table 5: Sensitivity analysis, Tobit estimates for government centralization, 26 Swiss cantons, 1980-1998**

Variable	Expenditure III	Expenditure IV	Revenue III	Revenue IV	Tax revenue III	Tax revenue IV
Budget referendum	-0.013*** (-5.769)	-0.009*** (-3.696)	-0.013*** (-6.434)	-0.009*** (-4.254)	-0.016*** (-4.476)	-0.008** (-2.237)
Homogeneity	-0.046 (-1.475)	-0.043 (-1.414)	-0.052* (-1.849)	-0.049* (-1.778)	0.136*** (2.908)	0.125*** (2.717)
Tax competition	-0.511*** (-11.107)	-0.530*** (-11.670)	-0.532*** (-12.625)	-0.552*** (13.278)	-0.926*** (-14.918)	-0.885*** (-14.475)
Lump-sum grants <sup>▼</sup>	0.111*** (3.735)	0.097*** (3.332)	0.137*** (5.047)	0.125*** (4.678)	-0.008* (-1.838)	-0.110** (-2.511)
Ratio of urban population	-0.292*** (-13.098)	-0.300*** (-13.633)	-0.297*** (-14.585)	-0.304*** (-15.164)	-0.153*** (-5.906)	-0.118*** (-4.501)
Population *	-0.289* (-1.875)	-0.228 (-1.498)	-0.280** (-1.995)	-0.224 (-1.619)	-1.251*** (-5.224)	-1.111*** (-4.745)
Coalition	-0.002 (-0.634)	-0.001 (-0.227)	-0.001 (-0.310)	0.0004 (0.159)	0.045*** (9.576)	0.042*** (9.091)
Fragmentation <sup>▼</sup>	-0.359*** (-9.693)	-0.332*** (-8.971)	-0.376*** (-11.136)	-0.349*** (-10.392)	-0.471*** (-8.730)	-0.396*** (-7.220)
Ideology	-0.036*** (-8.773)	-0.029*** (-6.982)	-0.035*** (-9.451)	-0.029*** (-7.559)	-0.067*** (-10.844)	-0.056*** (-8.610)
Language	-0.029*** (-2.944)	-0.039*** (-3.950)	-0.027*** (-2.997)	-0.036*** (-4.023)	0.047*** (3.224)	0.023 (1.536)
Cantonal income <sup>▼</sup>	2.240*** (3.458)	3.179*** (4.721)	1.538*** (2.585)	2.410*** (3.917)	3.202*** (3.238)	0.004*** (4.060)
Dummy Basel-Stadt	0.472*** (30.253)	0.473*** (30.837)	0.480*** (33.724)	0.481*** (34.418)	0.385*** (16.490)	0.377*** (16.462)
Dummy university cantons	0.113*** (13.559)	0.114*** (13.836)	0.112*** (14.699)	0.112*** (15.030)	0.113*** (10.005)	0.100*** (8.829)
Dummy town-meeting		0.041*** (4.251)		0.039*** (4.458)		0.061*** (4.905)
Controlling outliers	Yes	Yes	Yes	Yes	No	No
Observations	494	494	494	494	494	494
Log likelihood	860.153	869.026	902.585	912.326	636.554	647.970
Jarque-Bera	2.531	6.724**	3.554	4.925*	4.395	5.141*

For notes see *Table 2*.



The results in *Table 2* indicate that our theoretical considerations are confirmed for total revenue, total spending and tax revenue. The index of fiscal referendums has the expected negative sign and is significant at the 1 percent level. The more cantons allow for fiscal referendums in their constitutions, the less total spending, total revenue and tax revenue are centralized to the cantonal level. Cantons with popular budget referendums transfer a broader range of responsibilities to the local level compared to cantons where solely representatives decide about policy centralization. Looking at total expenditure, total revenue and tax revenue centralization, we thus find encouraging evidence supporting *Hypothesis 1*. The impact of the fiscal referendum index on government centralization is robust to an analysis of outliers. Its significance is increased when outliers are taken into account and the size of the coefficient does not vary considerably. While the coefficients in Tobit models cannot be interpreted quantitatively, its robustness nevertheless indicates that the inclusion or exclusion of outliers does not alter the consistency of the estimated coefficients of fiscal referendums.

In addition to the Tobit model, we have performed Logit transformations of the centralization ratios and estimated the same model with this transformed dependent variable by OLS in order to test whether the results are sensitive to the estimation method used. The results of this alternative estimation procedure, controlling for outliers, are presented in *Table A3* in *Appendix C* for government spending and in *Table A4* for government revenue. The results for centralization of total spending, total revenue and tax revenue in both tables confirm that of the Tobit model: Cantons with more influence of the people in a fiscal referendum have a significantly lesser extent of centralization to the cantonal level.

The same result holds, to a lesser extent, with respect to the budgetary structure of government activities, as the results in *Tables 3* and *A3* (controlling for outliers already) indicate. On the expenditure side, budget referendums are associated with a significantly lower centralization in the case of spending for the environment and education spending only. Centralization of administration, security, culture and recreation, health, finance and economy expenditures are not significantly affected by fiscal referendums. Finally, public welfare and traffic expenditure is *more* centralized in cantons that allow for fiscal referendums to a great extent. The latter results are however not robust to the estimation procedure as *Table A3* shows. Performing OLS regression with Logit transformed dependent variables renders most of these impacts insignificant. There is only a significant negative impact of the fiscal referendum on centralization of health and education spending. Since education spending reveals the most robust relationship between the fiscal referendum index and centralization and is in

addition the most important spending category, it can be concluded that the strongest effect of the fiscal referendum on centralization stems from its impact on education.<sup>7</sup>

The results for the revenue structure in *Table 4* (controlling for outliers) indicate that cantons allowing for a great extent of fiscal referendums are less centralized on the cantonal level as far as user charges and the different kinds of taxes are concerned. The index of fiscal referendums has again the expected negative sign that is significant at the 1 percent level in the case of (direct) taxes and user charges. Since the most important indirect taxes, the VAT and the mineral oil tax, are in Switzerland in the power of the federal government, we cannot say anything about centralization of indirect taxes. In addition, unimportant tax sources at the Swiss sub-federal level like car and dogs taxes are not considered because they are usually centralized to the cantonal level. Finally, inheritance taxes have to be taken out of account because they are (nearly) pure cantonal taxes as well. The same negative and highly significant impact of the index of fiscal referendum prevails however in the equations of centralization of property, income, profit and capital taxes. In those cases, the fiscal referendum is associated with less centralization to the cantonal level. All these results are very robust to an analysis of outliers. The negative impact of fiscal referendums on centralization of taxes and revenue is not affected by outliers. As *Table A4* indicates, these results are also robust to the estimation method used. With the exception of centralization of user charges, where it is significant at the 5 percent level, the fiscal referendum index is significant on the 1 percent level and has the expected negative sign in each equation. These results strongly support *Hypothesis 1*.

The control variables for the extent of fiscal federalism exhibit an interesting pattern. As the variable homogeneity suggests, the impact of income distribution in a canton only has a significantly positive influence on government centralization for tax revenue (*Table 2*). However, this impact is not robust including controls for outliers. In addition, as *Tables 3* and *4* indicate, a higher income homogeneity is significantly associated with less centralization in the case of culture and recreation, finance, traffic and economy spending, and with more centralization in the case of education expenditure and capital tax revenue. Of these results, only centralization of culture and recreation spending is not robust to the estimation procedure (*Table A3* and *A4*). All in all, income homogeneity does therefore not have a consistent impact on centralization of government activities in Switzerland. These results do neither

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<sup>7</sup> Education spending covered about 22.8 percent of total cantonal and local spending followed by health spending with 17.2 percent and welfare spending with 16.2 percent.

support the traditional tax competition hypothesis that decentralized redistribution is impossible, nor OATES' (1972) argument that government activity can be centralized if tastes are homogeneous. On the other hand, the rather mixed results are not really surprising since important programs of income redistribution like the federal income tax and social security are centralized to the federal level in Switzerland such that some arguments from the traditional theory of public finance cannot be tested with the data used in this paper (FELD, 2000).

The coefficients of tax competition between Swiss cantons show that the better the situation of a canton in the tax competition game, the more its government activities are decentralized. Put differently, the stronger tax competition among cantons is, in the sense that the competing cantons set their tax rates relatively low as compared to the canton considered, the more centralized taxes and, to a lesser extent, spending are to the cantonal level. This holds for general revenue, tax revenue and general spending (*Table 2*). With respect to the spending structure the proposed impact of tax competition holds especially for administration, health, welfare, education, traffic and environmental spending whereas the results for the other spending activities are mixed (*Table 3*). Using a different estimation procedure (*Table A3*), these results remain relatively robust with respect to their statistical impact, except centralization of welfare, traffic and environment spending.

With respect to revenue structure, there is a robust, significant impact of tax competition on the centralization of user charges and the different kinds of tax revenue (*Tables 4* and *A4*). These results are robust to the consideration of outliers and to the use of a different estimation procedure as well. The more the other cantons reduce their tax burden, the more taxes are centralized to the cantonal level. According to FELD and KIRCHGÄSSNER (2001a) tax competition is stronger at the Swiss local than at the cantonal level. The results obtained in this paper are consistent with these earlier results on tax competition in Switzerland. Cantons with a relatively bad situation in the tax competition game provide some relief for their communities by centralizing their taxes more strongly.

Economies of scale play a certain role in the centralization process at the Swiss cantonal level. The higher the share of urban population in the whole population, the less centralized total spending and total revenue, and the more centralized tax revenue (*Table 2*). This does however not consistently hold for each spending and revenue category. Revenue from user charges and nearly all tax revenue, except capital tax revenue, are more centralized the higher the share of urban population (*Table 4*). This result is relatively robust to the estimation procedure (*Table A4*). There is also significantly less centralization of administration,

security, culture and recreation, health and traffic spending, but more centralized finance spending in urban cantons (*Tables 3 and A3*). Moreover, the population size of the canton does not have a consistent impact on centralization.

From the remaining control variables, the coalition variable is particularly interesting. The more parties are represented in the cantonal cabinets, the stronger spending and revenue centralization are supposed to be. This result does however not consistently hold for several spending and revenue categories. A significantly positive impact is observed for culture and recreation, education and environment spending as well as user charges and capital taxes. There is a robust, significantly negative impact however regarding centralization of revenue from property and income taxes and of welfare spending. Total expenditure and revenue centralization is less pronounced in cantons with broader coalitions if outliers are successfully controlled for. The impact of the coalition variable is thus neither homogeneous, nor uniformly pointing to the proposed direction. Although there is a significantly negative impact of the variable 'geographical fragmentation' on centralization of total spending, total revenue and tax revenue, the impact of geographical fragmentation is also not robust across different spending and revenue categories. These very differentiated results depending on the spending and revenue category may indicate a trade-off. On the one hand, the impossibility of exploiting economies of scale in the consumption of publicly provided goods for small jurisdictions forces cantons to centralize a comparably broader range of government activities. On the other hand, a higher number of local incumbents restricts the stability of vote trading for collusion among jurisdictions and therefore leads to less policy centralization.

Moreover, as predicted by BRENNAN and BUCHANAN (1980), grants-in-aid as an instrument for collusive agreements between governments weaken the power of fiscal federalism. The empirical evidence partly supports this hypothesis in the Swiss case. The higher lump sum grants, the more centralized are most spending categories (*Tables 3 and A3*), but the less centralized are the different tax categories (*Table 4 and A4*). The remaining control variables, ideology, language and cantonal income exhibit consistent and clear-cut impacts on centralization of different tax categories as well as general revenue. While cantons with leftist governments and German speaking cantons have less centralization, those with a higher income per capita have more revenue centralization. The impact of these three variables on centralization of spending and spending structure is however more ambiguous.

Finally, the sensitivity of these results is tested with the facts that only 10 Swiss cantons have a university, and that a specific form of direct democracy, a cantonal meeting simi-

lar to a town meeting, exists in some Swiss cantons. The first sensitivity test is motivated by the result that the fiscal referendum index has a strong impact on education spending, which is the most important spending category at the Swiss cantonal and local levels, but not on many more spending categories. The fiscal referendum might perhaps be used more easily in cantons without a university, mistakenly indicating less centralization to the cantonal level in this spending category as this is due to the cantonal university. Such a reasoning would also lead to the conclusion that revenue should be more centralized in university cantons. On the other hand, the town meeting cantons are special in many respects. This group is comprised of some smaller mountainous cantons that may be able to centralize their public finances more strongly due to a higher homogeneity of the population. Since the fiscal referendum is an instrument that is mainly used in cantons without a town-meeting-like cantonal organization of direct democracy, the fiscal referendum index measures the wrong effect.

In order to test these arguments, the same Tobit estimations as in *Table 2* are performed and augmented by two dummy variables, the first taking on a value of one if a canton has a university and zero otherwise, and the other taking on the value of one if a canton has a town-meeting-like organization of direct democracy. The dummies are included in order to check the sensitivity of the impact of the fiscal referendum index on the two mis-specification arguments made above. *Table 5* indicates the results of this test strategy first by including the university canton dummy only and then adding the town meeting canton dummy as well.

Both variables are significant at the 1 percent level and have a positive sign. The impact of the university canton dummy is not reduced if the town meeting canton is included as well. The significantly positive impact of both variables on centralization of total spending, total revenue and tax revenue corresponds to the conjecture that university cantons must have a more centralized spending and revenue because the education service of the university and the subsequent spending is performed by the cantonal level, and to the conjecture that the small town meeting cantons have a higher centralization as well. Including the university canton dummy alone does not have a notable impact on the influence of the fiscal referendum index. It remains significant on the 1 percent level and the size and sign of the coefficient remain robust as well. Including the town meeting dummy in addition does not invalidate the impact of the fiscal referendum index. It remains significant at the 1 percent level and keeps the negative sign. The coefficient is however reduced. In the equations with the town meeting dummy, the hypothesis of normal distribution of the residuals can be rejected. Controlling for the additional outliers does not considerably change the influence of the fiscal referendum dummy.

All in all, we thus find encouraging empirical results supporting our theoretical predictions that policy centralization is less likely when a budget referendum is available.

## **VII. Conclusions**

In this paper, the first empirical test is performed as to whether referendums prevent centralization of government activity. On the basis of a model of REDOANO and SCHARF (2000), we have shown that the degree of centralization is lower under direct than under representative democracy if preferences in local jurisdictions are sufficiently heterogeneous. In addition, referendums help to mitigate common pool problems as the costs emerging from centralization. Based on the predictions of this model, we have conducted an econometric analysis of the centralization of spending and revenue using panel data of Swiss cantons for the period 1980 to 1998. Our results broadly support the hypothesis that budget referendums restrict the ability to centralize government activities. This does not only hold with respect to the centralization of revenue and spending in general, but also to several spending and revenue categories. In addition to the referendum, fiscal federalism plays a role, although the impact of different proxies for the extent of fiscal federalism is heterogeneous. For example the less comfortable the position of a canton in the tax competition game with other cantons, the more government activities are centralized to the cantonal level.

From a positive perspective, referendums are associated with less centralization of government activities. This does however not imply any particular normative interpretation. The model of RS used in this paper starts from the perspective that centralization is useful due to inter-jurisdictional externalities (or economies of scale). We only use this model as a workhorse without subscribing to its normative implications. That's why we already slightly adapt the model to the reasoning of BESLEY and COATE (1999) and PERSSON and TABELLINI (2000), and add a common pool interpretation. In fact, centralization might be a consequence of political failure, if representatives at the central level have a vested interest in centralization to obtain personal rents or securing re-election. Then referendums serve to safeguard the proper interests of sub-ordinate jurisdictions.

The results in this paper do not help to solve this normative discussion. Given the results for the control variables, traditional fiscal federalism variables as well as proxies for the severity of common pool problems play a certain role. The estimation methods used do not allow to assess which variables have the quantitatively more important impact on centralization of government activities. This has to be left for future research.

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## Appendix A

**Table A1: Data description**

<i>Variable name</i>	<i>Description</i>	<i>Source</i>
Structure of Revenue share	Real total cantonal revenue per capita as a share of real cantonal and local revenue per capita.	Own calculations on the basis of the Swiss Federal Finance Administration
Structure of Expenditure share	Real total cantonal spending per capita as a share of real cantonal and local spending per capita.	Own calculations on the basis of the Swiss Federal Finance and Tax Administration
Homogeneity	Ratio between the real personal income of the median taxpayer compared to the average taxpayer	Own calculations on the basis of the Swiss Federal Tax Administration
Tax competition	Weighted average of the tax burdens of all other cantons for the highest income class; Weight: Inverse of geographical distance.	Own calculations on the basis of data from the Swiss Federal Tax Administration
Lump-sum grants	Real federal lump-sum grants per capita	Own calculations on the basis of the Swiss Federal Finance Administration
Language	Dummy=1 for German speaking cantons	Own calculations
Fragmentation	Number of communes in a canton	Swiss Federal Statistical Office
Population	Cantonal population	Swiss Federal Statistical Office
Cantonal income	Real cantonal income per capita	Swiss Federal Finance Administration
Ratio of urban population	Proportion of communes having more than 10'000 inhabitants.	Swiss Federal Statistical Office
Ideology	Index between 1 (right) to 5 (left) that measures the relative strength of parties in government with reference to the Left-Right dimension.	Own calculations on the basis of data from the cantonal governments.
Budget Referendum	Index designed to reflect the extent of budget referendum possibilities within a range between 1 (lowest) and 6 (highest degree).	Own calculations for an index proposed by Frey and Stutzer (2000) on the basis of data from Trechsel and Serdült (1999).
Coalition	Number of parties in cabinet.	Own calculations on the basis of data from the cantonal governments.

**Appendix B**

<i>Table A2: Descriptive statistics</i>				
<i>Variable</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Minimum</i>	<i>Maximum</i>
General Revenue	67.0%	10.7%	50.5%	99.8%
User Charges	47.5%	22.4%	7.4%	99.2%
Tax Revenues	56.9%	13.2%	20.9%	97.7%
Tax on expenditure	97.0%	3.4%	76.1%	100%
Tax on income and property	54.7%	14.0%	24.6%	97.9%
Tax on property	51.4%	14.9%	18.7%	100%
Tax on income	51.1%	13.8%	26.4%	93.9%
Tax on profit	55.5%	17.7%	13.5%	100%
Tax on capital	55.1%	18.0%	19.8%	100%
Tax on inheritance	91.3%	0.2%	44.5%	100%
General Expenditure	66.9%	10.8%	51.0%	99.6%
Administration	49.0%	13.1%	26.2%	94.7%
Security	75.7%	11.1%	11.0%	99.9%
Culture and Recreation	34.7%	18.9%	8.0%	97.8%
Health	70.2%	24.8%	10.0%	100%
Public Welfare	73.1%	15.5%	39.8%	99.7%
Education	64.2%	18.1%	50.5%	99.7%
Finance	67.1%	17.5%	17.9%	99.9%
Traffic	69.5%	13.6%	33.5%	98.7%
Economy	84.0%	12.6%	42.9%	99.9%
Environment	35.0%	20.9%	7.2%	98.9%
Homogeneity	83.5%	7.3%	65.5%	99.7%
Tax competition	0.237	0.08	0.098	0.419
Lump-sum grants	1099	688	328	4152
Language	73.1%	44.4%	0.0%	100%
Fragmentation	115.5	113.9	3	412
Population	258'519	271'073	12'757	1'183'568
Ratio of urban population	30.6%	24.4%	0.0%	99.5%
Ideology	3.3	0.7	2	5
Budget Referendum	4.0	1.4	1.0	6.0
Cantonal income	25.9	5.8	17.7	54.0
Coalition	3.3	0.9	1	5
<i>Note:</i>				
For a detailed description of the variables see Appendix A.				
All statistics are computed for 494 observations.				
The statistics for revenues, expenditure and lump-sum grants are measured in real terms per capita.				

## Appendix C

**Table A3: Log-odds estimates for government centralization, expenditure structure, 26 Swiss cantons, 1980-1998**

Variable	Total expenditure										
	Admini- stration	Security	Culture and recreation	Health	Welfare	Education	Finance	Traffic	Economy	Environment	
Budget referendum	-0.030** (-2.309)	0.005 (0.350)	0.010 (0.814)	0.007 (0.343)	-0.071** (-2.360)	0.033 (1.303)	-0.057*** (-5.387)	0.017 (0.623)	0.0002 (0.011)	-0.038 (-0.909)	-0.032 (-1.243)
Homogeneity	-0.118 (-0.856)	-0.095 (-0.571)	0.102 (0.775)	-0.370 (-1.595)	0.473** (2.147)	0.065 (0.264)	0.232* (1.655)	-1.031*** (-3.134)	-0.334* (-1.656)	-1.201*** (-2.963)	0.031 (0.120)
Tax competition	-0.452* (-1.932)	-0.571** (-2.205)	0.883*** (3.754)	0.135 (0.430)	-8.490*** (-10.389)	-0.495 (-1.266)	-1.440*** (-5.122)	0.882 (1.533)	-0.418 (-1.101)	0.672 (0.886)	-0.105 (-0.233)
Lump-sum grants <sup>♥</sup>	0.026 (0.177)	0.249 (1.428)	0.497*** (3.627)	0.891*** (3.477)	-0.401* (-1.884)	-0.110 (-0.475)	-0.247** (-2.022)	0.250 (0.734)	0.043 (0.145)	1.307*** (3.436)	0.800*** (3.089)
Ratio of urban population	-0.226** (-2.435)	-0.413*** (-4.025)	-0.619*** (-6.711)	-0.917*** (-6.545)	-2.103*** (-6.277)	0.049 (0.302)	0.284** (2.154)	0.839*** (2.742)	-0.449** (-2.850)	0.258 (0.959)	0.162 (0.934)
Population <sup>▲</sup>	-0.771 (1.056)	1.871** (2.191)	-0.714 (-0.941)	0.834 (0.713)	-10.211*** (-5.189)	-1.831* (-1.740)	-0.023 (-0.021)	-4.211** (-2.356)	1.161 (0.968)	-2.951 (-1.227)	-2.101* (-1.704)
Coalition	-0.028 (-1.406)	-0.035 (-1.574)	-0.024* (-1.662)	0.081** (2.891)	0.238*** (5.923)	-0.180*** (-4.910)	0.012 (0.677)	-0.003 (-0.065)	0.011 (0.333)	-0.148*** (-2.649)	-0.037 (-1.105)
Fragmentation <sup>♥</sup>	-0.529** (-2.516)	-0.914*** (-4.645)	0.361* (1.760)	0.385 (1.371)	-2.980*** (-5.498)	0.375 (1.289)	0.704* (1.943)	-0.063 (-0.136)	-1.528*** (-4.899)	0.648 (1.066)	0.002 (0.006)
Ideology	-0.0436** (-2.107)	-0.038 (-1.628)	0.0233 (1.207)	0.055* (1.853)	-0.062 (-1.112)	-0.031 (-0.842)	-0.031 (-1.186)	0.015 (0.336)	-0.075*** (-3.048)	0.086 (1.584)	-0.058 (-1.417)
Language	-0.139*** (-3.114)	-0.108** (-2.206)	-0.104** (-2.192)	-0.076 (-1.060)	1.655*** (11.574)	-0.579*** (-6.685)	-0.087 (-1.151)	0.076 (0.520)	-0.217** (-2.284)	0.153 (0.870)	0.019 (0.196)
Cantonal income <sup>♥</sup>	3.138 (1.011)	2.951 (0.757)	-1.078 (-0.361)	-1.537 (-0.254)	11.892* (1.827)	5.075 (0.932)	8.876** (2.585)	-20.567** (-2.443)	-5.343 (-0.848)	-7.684 (-0.858)	-1.033 (-0.146)
Dummy	1.756*** (13.700)	1.450*** (18.223)	3.101*** (43.392)	2.400*** (24.963)	1.478*** (6.931)	1.584*** (11.364)	1.836*** (22.836)	0.936*** (4.321)	1.237*** (10.559)	0.222 (0.876)	1.881*** (10.954)
Controlling outliers	Yes	No	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes
Observations	494	494	494	494	494	494	494	494	494	494	494
R <sup>2</sup> adj.	0.880	0.732	0.926	0.793	0.945	0.704	0.915	0.501	0.696	0.362	0.779
Jarque-Bera	3.983	0.347	0.135	0.419	2.691	3.728	0.766	3.252	2.414	4.855*	3.857

*Note:* Government centralization stands for the state share of state and local revenues. *t*-values are given in parentheses. All regressions contain 19 year-dummies whose coefficients are not reported. \*\*\*, \*\* and \* indicate significance at 1%, 5% and 10% levels, respectively. ♥, ▲, ▲: scaled by 10<sup>3</sup>, 10<sup>5</sup>, 10<sup>7</sup>, respectively for readability. The Jarque-Bera test statistic is a test on the null hypothesis of normality of the residuals.

<b>Table A4: Log-odds estimates for government centralization, revenue structure, 26 Swiss cantons, 1980-1998</b>								
Variable	General revenue							
	Tax revenue	User Charges	Tax on income and property	Tax on property	Tax on income	Tax on profits	Tax on capital	
Budget referendum	-0.030** (-2.389)	-0.025*** (-2.981)	-0.053** (-2.464)	-0.025*** (-2.925)	-0.032*** (-5.567)	-0.032*** (-6.423)	-0.024*** (-2.945)	-0.029*** (-3.296)
Homogeneity	-0.145 (-1.101)	-0.022 (-0.208)	0.279 (1.028)	-0.052 (-0.472)	-0.012 (-0.171)	0.002 (0.021)	0.065 (0.777)	0.217*** (3.235)
Tax competition	-0.457** (-2.002)	-0.686*** (-4.955)	-1.139* (-1.853)	-0.731*** (-5.275)	-1.015*** (-8.413)	-0.984*** (-9.363)	-0.876*** (-5.286)	-0.820*** (-4.543)
Lump-sum grants <sup>▼</sup>	0.068 (0.494)	-0.456*** (-5.737)	-1.518*** (-5.967)	-0.458*** (-5.537)	-0.234*** (-4.550)	-0.343*** (-6.260)	-0.346*** (-4.477)	-0.232*** (-3.223)
Ratio of urban population	-0.259*** (-2.957)	0.249*** (3.202)	1.243*** (4.495)	0.268*** (3.247)	0.337*** (5.123)	0.322*** (5.124)	0.517*** (5.197)	-0.306*** (-3.851)
Population <sup>▲</sup>	0.845 (1.215)	-0.937 (-1.431)	-5.481*** (-2.806)	-0.810 (-1.221)	-0.682 (-1.540)	-0.712* (1.769)	-1.691*** (-2.890)	5.011*** (4.874)
Coalition	-0.029 (-1.507)	-0.008 (-0.560)	0.063* (1.738)	-0.011 (-0.814)	-0.023** (-2.477)	-0.021** (-2.273)	-0.014 (-0.860)	0.075*** (6.265)
Fragmentation <sup>▼</sup>	-0.563*** (-2.744)	-0.219 (-1.476)	-1.244*** (-2.896)	-0.228 (-1.508)	-0.002 (-0.018)	-0.042 (-0.418)	-0.354** (-2.301)	-1.071*** (-5.575)
Ideology	-0.042** (-2.058)	-0.063*** (-4.822)	-0.263*** (-5.088)	-0.063*** (-4.690)	-0.046*** (-3.653)	-0.040*** (-3.593)	-0.099*** (-4.211)	-0.023** (-1.999)
Language	-0.142*** (-3.496)	-0.076*** (-2.867)	0.119 (0.944)	-0.076*** (-2.698)	-0.072*** (-3.028)	-0.072*** (-3.472)	-0.110*** (-3.937)	0.003 (0.084)
Cantonal income <sup>▼</sup>	2.444 (0.800)	0.006** (2.435)	11.501 (1.361)	5.687** (2.322)	6.515*** (3.970)	6.138*** (3.555)	3.891 (1.435)	9.865*** (4.957)
Dummy Basel-Stadt	1.762*** (13.693)	1.320*** (27.694)	0.737*** (4.000)	1.380*** (27.611)	8.869*** (235.081)	0.984*** (26.809)	2.000*** (32.644)	0.469*** (10.626)
Controlling outliers	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	494	494	494	494	494	494	494	494
R <sup>2</sup> adj.	0.887	0.950	0.835	0.950	0.999	0.965	0.998	0.855
Jarque-Bera	4.450	2.014	1.505	4.544	2.084	2.801	2.331	4.436

*Note:*  
 Government centralization stands for the state share of state and local revenues. *t*-values are given in parentheses. All regressions contain 19 year-dummies whose coefficients are not reported. \*\*\*,\*\* and \* indicate significance at 1%, 5% and 10% levels, respectively. ▼, \*, ▲: scaled by 10<sup>3</sup>, 10<sup>5</sup>, 10<sup>7</sup>, respectively for readability. The Jarque-Bera test statistic is a test on the null hypothesis of normality of the residuals.