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**On Government Centralization and Fiscal  
Referendums: A Theoretical Model and  
Evidence from Switzerland**

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# On Government Centralization and Fiscal Referendums: A Theoretical Model and Evidence from Switzerland

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## Abstract

We propose and test a positive model of fiscal federalism in which centralization is less likely to occur in jurisdictions with referendum decisions on policy centralization. Citizens choose centralization of public spending and revenue in order to internalize spillovers if individual preferences in two jurisdictions are sufficiently homogeneous. Under representative democracy, centralization is inefficiently high because representatives can extract political rents by policy centralization. Referendums thus restrict representatives' ability for rent extraction. An empirical analysis using a panel of Swiss cantons from 1980 to 1998 supports the hypothesis that centralization is less likely under referendum decision-making.

*Keywords:* Centralization, Fiscal Federalism, Fiscal 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 being referred to the national, the local and in particular to the State legislatures” (HAMILTON, MADISON and JAY, 1787/88, p. 83). 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 worse off, the residents who want more of a public good and the residents who want less of a public good. 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.

A large body of literature has followed the normative theory of fiscal federalism developing conditions under which centralization of government activities or coordination among sub-federal governments should be undertaken. Interregional externalities in the form of cost or benefit spillovers provide arguments for coordination activities. Tax competition creates fiscal externalities between jurisdictions and provide reasons for centralization (WILSON and WILDASIN, 2004). 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. Finally, macro-economic stabilization can be provided more effectively at the federal level. However, there are also theoretical arguments against each of these reasons for centralization. For example, fiscal and regional externalities may offset each other (SØRENSEN, 2004). Internalization of externalities can be reached by voluntary transfers between jurisdictions (MYERS, 1990).

Therefore, the normative question to what extent government services and tasks should be decentralized is still disputed.<sup>1</sup>

BESLEY and COATE (2003) challenge this welfare theoretical approach: In a framework of benevolent governments taking different preferences in different jurisdictions into account, a centralized system is as well able to allocate different levels of public goods to different districts financed by general taxation as sub-federal governments. But unlike a decentralized decision-making process the centralized provision accompanied by decentralized administration can internalize cross-border externalities. Therefore, according to BESLEY and COATE (2003) the rationale of decentralization must be explained by political economy considerations. In their framework, locally provided public goods are chosen 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 centralized 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), it can be argued that 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 then aggravated by vote trading between policymakers of different jurisdictions ('I'll scratch your back, you'll scratch mine'). Although federalist systems may be desirable, they are therefore inherently unstable and subject to secular trends towards centralization. This point is already mentioned by RIKER (1964) and is empirically

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1 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).

2 The analysis by LOCKWOOD (2002) is similar to BESLEY and COATE's (2003) model. PERSSON and TABELLINI (1994) also use a political economy analysis to show the importance of decentralization in restricting government discretion. See also ALESINA and SPOLAORE (1997), BOLTON and ROLAND (1997), INMAN and RUBINFELD (1997), PERSSON and TABELLINI (2000), and TOMMASI and WEINSCHELBAUM (2003).

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. Therefore, from a normative point of view, it is important to find out how different constitutional provisions shape the degree of policy centralization in a polity.

However, little attention has been given to the empirical question whether different degrees of government centralization can be explained by institutional differences among jurisdictions. WALLIS and OATES (1988) explore the process of government centralization for U.S. state and local governments from 1902 to 1982. They investigate various hypotheses concerning fiscal federalism but do not include a political economy explanation of centralization. STRUMPF and OBERHOLZER-GEE (2002) for the U.S. states as well as CERNIGLIA (2003) for a sample of OECD countries present evidence that preference heterogeneity more likely induces policy decentralization. Again, constitutional differences are not considered by these authors. In a further study, BAKER (2000) takes a top-down perspective on centralization by concentrating on 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 attract local spending responsibilities to the state level. 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 the highest courts and their age significantly reduce centralization. BLANKART (2000) argues in a comparative case study of Germany and Switzerland that institutional differences between both countries, in particular the extent of direct democracy, explains the different centralization outcomes. He does however not provide systematic evidence. In a convincing study, PANIZZA (1999) presents evidence that in about 60 countries a higher level of democracy is associated with less centralized government activity.<sup>3</sup> GARRETT and RODDEN (2003) corroborate these results for a panel of 47 states and the period 1978-1997. In addition, their results indicate that more open economies have more fiscal centralization. However, the democracy index used by PANIZZA or GARRETT and RODDEN is not sufficiently differentiated and does not distinguish the impacts of specific constitutional provisions on policy centralization.

The purpose of this paper is to examine different degrees of centralization in representative and direct democratic regimes and thus contribute to the question whether different constitutional provisions shape policy centralization. We develop a theoretical model that is in the

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3 For an earlier study along these lines see POMMEREHNE and KIRCHGÄSSNER (1976).

spirit of BESLEY and COATE (2003) and show that referendums induce more decentralized provision and financing of public services. The intuition is simple: If spillovers of public goods between two jurisdictions exist and individual preferences in the jurisdictions are sufficiently homogeneous, citizens have incentives to centralize policies. Compared to elected representatives, they are however more reluctant to delegate competencies to the central level. With representative democracy and cooperative decision-making on the central level, the common pool problem emerges and gives representatives leeway to extract political rents. This is anticipated by voters. With direct democratic institutions on the central level, implying non-cooperative decision-making, voters face additional uncertainty, *ex ante* not knowing precisely which position the median voter will have in the newly shaped electorate. In a representative system, the uncertainty about the outcome of the centralized political process can be reduced, for instance by gerrymandering. Both arguments together imply that centralization is more likely to be agreed upon by local representatives compared to local median voters.

In a related paper, REDOANO and SCHARF (2004) 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. 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. In contrast to our model, Redoano and Scharf do not consider that representatives might extract political rents. In addition, they assume preference heterogeneity in the different jurisdictions.<sup>4</sup>

We test the hypothesis that referendums lead to less centralization with panel data from the 26 Swiss cantons from 1980 to 1998 proposing an econometric model that captures federalist organization including standard controls. Our empirical investigation supports the view that popular referendums restrict government centralization. We find that fiscal referendums are

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4 See also the papers by CRÉMER and PALFREY (1996) and LOCKWOOD (2004). Crémer and Palfrey are not concerned with the benefits of centralization in a world of regional externalities. They study whether centralization will more probably occur under aggregation of votes at the national (unitary referendum) or the district levels (sub-federal referendum). Lockwood studies the assignment of competencies under unitary and federal referendums by considering economies of scale as a benefit and political inefficiencies as a cost of central provision. Under certain conditions, he shows that both kinds of referendums may be efficient.

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. Thus, our paper 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, KIRCHGÄSSNER, FELD and SAVIOZ, 1999, MATSUSAKA, 2004). 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 fiscal referendums on government centralization.<sup>5</sup>

The paper is organized as follows: In Section II, we present our theoretical model on the impact of referendums on government centralization. In Section III we present some anecdotal evidence how referendums reduce the extent of centralization. In Section IV, stylized 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. A Political Economy Model of Centralization and Referendums

### 1. Infrastructure of the model

In order to show that centralization of public goods provision is more likely under representative than direct-democratic political institutions, we use a model with two regions where different local public goods are provided and inter-jurisdictional utility spillovers occur. Suppose that, partially resembling the specifications of BESLEY and COATE (2003) and DUR and ROELFSMA (2002), an individual  $I$  in one of the regions  $i, j \in 1, 2$  with  $i \neq j$  has the utility function

$$U_i^I = x + \lambda^I [b(g_i) + \gamma b(g_j)] \quad (1)$$

where  $x$  is the amount of private goods consumed,  $g$  is the quantity of a local public good,  $0 < \gamma \leq 1$  is a spillover parameter indicating, for instance, geographical proximity between the two regions and  $b(\cdot)$  is a strictly concave, increasing valuation function for public goods. Note that  $\gamma$  is a parameter to indicate only the magnitude of spillovers generated by public good provision in one region for the other, and thus has a positive sign. In combination with our specification of the valuation function, it is therefore evident that we focus on the impact

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<sup>5</sup> MATSUSAKA (2004) distinguishes between state and local revenue and spending in his study for the U.S., but he does not explicitly analyze centralization.

of positive externalities on the willingness to centralize public good provision, which is in line with the related approaches cited above.

To simplify, we assume that the parameter  $\lambda$  denotes the preferences for public goods and is distributed over an interval  $(0, \bar{\lambda}]$  such that the median preference is identical in both regions,  $\lambda_i^m = \lambda_j^m = 1$ . Furthermore, let the public good preferences of political representatives be distributed over the same interval so that, if a representative is drawn randomly, her expected public goods' preference is  $E(\lambda^r) = 1$ . The true value of  $\lambda$  of a representative who is in office and has already made a decision on the supply of public goods at least once can be generally inferred by the median voter based upon that decision. When a choice about institutional change (centralization) is made, however, then this is de facto a constitutional choice which is not made with this particular representative in mind, but with a concern about yet unknown future representatives. On this constitutional level, a calculus based on the assumption that  $E(\lambda^r) = 1$  is thus entirely rational.

Both regions are inhabited by an equal number of  $n$  individuals. Also, the technologies of public goods' provision are identical in both regions and public goods are financed by lump sum taxes such that each individual has to give up one unit of the private good in order to allow for the provision of one unit of a local public good. In other words, regions are completely identical as far as the technicalities of public good provision are concerned, with the only qualification that the kinds of local public goods differ. Therefore, the main difference between our model and, e.g., BESLEY and COATE (2003), is that the latter captures a greater deal of complexity by integrating multiple sources of regional heterogeneity – the types of local public goods, different values of  $\lambda$  over and within the regions – while we focus only on one source of diversity.

Finally, we assume that a representative who is in office can secure a rent from every unit of a local public good that is supplied under his legislation. Thus, while a representative formally has to pay the same lump-sum tax as every other citizen, his effective contribution is only  $\sigma g_i$  with  $0 < \sigma < 1$  (i.e., he secures a rent of  $(1 - \sigma)$  per unit of public goods).

## 2. *Three regimes of public good provision*

Regarding the political institutions of public goods' provision, three different regimes are distinguished and for each institutional framework, the decision of a representative can be con



trusted with the decision of a median voter. Regarding the latter, one could raise the objection that the empirical part of this paper concerned with Switzerland, is characterized not by pure direct democratic institutions, but by a hybrid institutional framework involving both representative and direct democratic elements. Nevertheless, there are reasons for picking a pure direct-democratic median voter model here: If a decision by representatives to centralize is subject to mandatory approval through an obligatory referendum, then the median voter effectively makes the definitive decision. If, on the other hand, an optional referendum may or may not be called for by the people, then whether the median voter or the representative is decisive depends on the costs of organizing an optional referendum. These costs, however, are rather low at the local level in Switzerland. In addition to that, organized political parties or groups with a bias towards decentralization usually exist already and bear the costs of initiating an optional referendum. Essentially, therefore, individual costs of organizing an anti-centralization interest group and of calling for an optional referendum can be neglected in the calculus of the median voter and on the theoretical level, a mandatory and an optional referendum can be treated alike. FELD and KIRCHGÄSSNER (2001) and FELD and MATSUSAKA (2003) show how mandatory and optional referenda correct policy outcomes towards median voter preferences that it would be the case under pure representative democracy.

**Decentralized public good provision.** In this case, the median voter in each jurisdiction is interested to solve

$$g_i^{Dm} = \arg \max_{g_i > 0} U_i^m - g_i \quad (2)$$

which leads to the first order condition of  $\partial b(g_i)/\partial g_i = 1$  for an optimal  $g_i^{Dm}$ . A representative on the other hand aims at

$$g_i^{Dr} = \arg \max_{g_i > 0} U_i^r - \sigma g_i \quad (3)$$

where  $U_i^r = x + \lambda^r [b(g_i) + \gamma b(g_j)]$  which leads to the first order condition of  $\partial b(g_i)/\partial g_i = \sigma / \lambda^r$  for an optimal  $g_i^{Dr}$ . A median voter endowed with perfect knowledge would thus choose a representative with a preference for public goods  $\lambda^r = \sigma$ . Without credible signaling mechanisms for the representatives' true public goods' preferences, however, the expected true value of  $\lambda^r$  is  $E(\lambda^r) = 1$ . In this case, representative democracy is associated with expected overspending, the actual extent of which will depend on influences not for

mally considered here, such as the likelihood for ex post punishment via retrospective voting. If, on the other hand, a fiscal referendum is obligatory or can be organized at sufficiently low cost, overspending will be avoided.

**Centralized, cooperative public good provision.** To analyze this institutional framework, we assume, closely related to WEINGAST (1979), that both elected representatives express their wishes for the level of public goods in their own jurisdiction and engage in pork-barrel politics thereafter. Also, a simple cost-sharing rule is assumed, which states that the total costs of public good provision are divided equally between both jurisdictions. Each representative then solves

$$g_i^C = \arg \max_{g_i > 0} U_i^r - \frac{\sigma}{2}(g_i + g_j) \quad (4)$$

so that the first order condition is  $\partial b(g_i)/\partial g_i = \sigma/2$ . From the symmetry assumption, it follows that  $g_j^C = g_i^C$ . Letting the median voter in each jurisdiction decide about which public good levels she would prefer under this regime of cost sharing would, on the other hand, lead to the first order conditions  $\partial b(g_i)/\partial g_i = 1/2$  and  $\partial b(g_j)/\partial g_j = 1/2\gamma$ . Measured against the median preferences, a collusive agreement between regional representatives would therefore always lead to overspending compared to the median preferences, even if  $\sigma = 1$ , as long as spillovers are not complete and  $\gamma < 1$ .

**Centralized, non-cooperative public good provision.** Suppose that, while the cost-sharing rule from the cooperative regime remains the same, the spending levels are not decided upon by collusive agreement between representatives, but that decision-making power is delegated to centralized institutions of collective decision-making. Suppose further that, on the central level, a decision is made between a spending proposal drafted in  $i$  and a spending proposal drafted in  $j$ . Then,  $p$  denotes the probability that a proposal from  $i$  is chosen at the central level, and correspondingly,  $(1 - p)$  is the probability of choice for the proposal from  $j$ . The uncertainty about the outcome of the centralized decision will usually have multiple reasons: voter turnout may be different across jurisdictions, in a representative system constituencies may be shaped to influence the result in a certain direction and so on.

If a non-cooperative spending proposal is passed by a referendum, the median voter on the local level will choose

$$\{g_i^{Nm}, g_j^{Nm}\} = \arg \max_{g_i > 0; g_j > 0} U_i^m - \frac{1}{2}(g_i + g_j) \quad (5)$$

with the first order conditions being  $\partial b(g_i)/\partial g_i = 1/2$  and  $\partial b(g_j)/\partial g_j = 1/2\gamma$ . If, on the other hand, a non-cooperative spending proposal is drafted by a representative, his choice will be

$$\{g_i^{Nr}, g_j^{Nr}\} = \arg \max_{g_i > 0; g_j > 0} U_i^r - \frac{\sigma}{2}(g_i + g_j), \quad (6)$$

yielding as first order conditions  $\partial b(g_i)/\partial g_i = \sigma/2$  and  $\partial b(g_j)/\partial g_j = \sigma/2\gamma$ .

### 3. Pathways to a centralization of spending competencies

**Centralization via referendum.** Presuming that the status quo is a decentralized setting and that we are interested in processes of centralization, the interesting question is to see under which conditions the electorate or representatives are inclined to agree to a centralization of public spending. Comparing the median voter's utility under a decentralized, direct democratic regime with that under a cooperatively centralized regime, it is easy to see that centralization will be preferred if

$$b(g_i^C) + \gamma b(g_j^C) - \frac{1}{2}(g_i^C + g_j^C) > b(g_i^{Dm}) + \gamma b(g_j^{Dm}) - g_i^{Dm}. \quad (7)$$

Since it follows from our symmetry assumption that  $g_i^C = g_j^C$  and  $g_i^{Dm} = g_j^{Dm}$ , we can note

*Lemma 1.* If  $\sigma$  is sufficiently large to ensure that the left hand side of (8) is not smaller than  $1/2$ , then there always exists a  $\gamma_1^* \leq 1$  so that

$$\frac{b(g_i^C) - b(g_i^{Dm})}{g_i^C - g_i^{Dm}} > \frac{1}{1 + \gamma} \quad (8)$$

and the median voter prefers cooperatively centralized over decentralized provision of public goods.

*Proof.* Eq. (8) follows immediately from (7). From our first order conditions, it follows that the slope of  $b(\cdot)$  at  $g_i^{Dm}$  equals unity, while it equals  $\sigma/2 \leq 1/2$ , at  $g_i^C$ . The left hand side of (8) displays the slope of the secant that runs through  $g_i^C$  and  $g_i^{Dm}$ . Therefore, and due to the concavity of  $b(\cdot)$ , the value of the left hand side has to be strictly smaller than unity and larger

than  $\sigma/2$ . For very small values of  $\sigma$ , the slope of the secant may be smaller than the right hand side of (8) even for  $\gamma = 1$ . Thus, centralization will only be favored if the rents appropriated by the representatives are sufficiently small and the spillovers are sufficiently large.

If the decentralized, direct-democratic regime competes against a non-cooperative, centralized regime with direct-democratic decision-making over the spending proposals, non-cooperative centralization will be preferred if

$$p[b(g_i^{Nm}) + \gamma b(g_j^{Nm})] + (1-p)[b(g_j^{Nm}) + \gamma b(g_i^{Nm})] - \frac{1}{2}[g_i^{Nm} + g_j^{Nm}] > b(g_i^{Dm}) + \gamma b(g_j^{Dm}) - g_j^{Dm}. \quad (9)$$

Note that the costs are not state-dependent due to the symmetry assumption; the same amount will be spent on public goods regardless of which spending proposal is implemented, but it will be differently allocated across regions. Based upon this inequality, we can state

*Lemma 2.* For any  $p \in [0, 1]$ , there exists a  $\gamma_2^* \leq 1$  that is sufficiently large to make non-cooperative centralization preferred over decentralization for the median voter. For  $p = 1$ , centralization is preferred for any  $\gamma \in [0, 1]$ .

*Proof.* See Appendix A.

If  $v(\gamma)$  denotes the expected benefits from centralization and  $w(\gamma)$  denotes the expected extra costs, then, as is shown in the proof of *Lemma 2*,  $w(1)$  and  $v(1)$  are independent of  $p$ , whereas the curve of  $v(\gamma < 1)$  rotates to the southeast with declining  $p$  and may even become negative for a combination of low values of  $p$  and  $\gamma$ . In other words, the interval  $[\gamma_2^*, 1]$  where centralization is preferred shrinks with a declining  $p$ . The obvious problem with centralization decisions is that not both jurisdictions can have  $p \approx 1$  at the same time. If it is very likely that the proposal from  $i$  succeeds on the central level, then it has to be very unlikely that the proposal from  $j$  succeeds. From these considerations follows

*Lemma 3.* The interval  $[\gamma_2^*, 1]$  where both median voters favor non-cooperative centralization is the largest, when  $p = 1/2$ .

*Proof.* It is obvious that the interval of consensual centralization is the largest, when both median voters have the same threshold spillover level for favoring centralization. Given our symmetry assumptions, this is the case at  $p = 1/2$ .

**Centralization by consenting representatives.** Decision-making on the centralization of spending competencies is highly path-dependent. If budgetary decisions in the local jurisdictions are subject to a popular referendum, it is usually not possible for representatives to decide upon the centralization of spending decisions – the centralization decision itself would have to be legitimized via a referendum. Thus, the status quo for centralization by consenting representatives are local jurisdictions with representative decision-making – in other words, we assume that representatives cannot on their own authority suspend local direct democracy by creating a centralized representative system. For a representative to favor cooperative centralization, it is then necessary that

$$b(g_i^c) + \gamma b(g_j^c) - \frac{\sigma}{2}(g_i^c + g_j^c) > b(g_i^{Dr}) + \gamma b(g_j^{Dr}) - \sigma g_i^{Dr} \quad (10)$$

Solving this inequality leads to

*Lemma 4.* There exists a level of rent extraction  $\bar{\sigma} \in [0, 1)$  for which cooperative centralization will be preferred by representatives for a level of spillovers  $\gamma_3^* < \gamma_1^*$ . Contrary to direct democracy, decision-making by representatives also ensures that even with very high levels of rent extraction, there is a spillover-level for which centralization is preferred.

*Proof.* See Appendix A.

If, on the other hand, non-cooperative centralization is to be attained,  $\sigma$  is a rather unreliable instrument to increase the range of spillovers for which centralization is preferred. The reason is simple: Cooperative centralization via referendum involves a delegation of decision-making powers to representatives on the central level; non-cooperative centralization involves no such thing, because in this case, centralized decision-making remains subject to a popular referendum. Even with a low  $\sigma$ , the threat of excessive spending under a centralized regime does not exist, because a referendum is necessary. Due to the missing necessity of delegation, voters are less reluctant to centralize in the non-cooperative case. If, for instance,  $b(g) = a \cdot g^\alpha$  with  $a > 0, 0 < \alpha < 1$  is chosen as the specification for the valuation function, then  $\sigma$  has no impact at all on the value of  $\gamma^*$ . For other specifications, such as  $b(g) = \ln(1 + a \cdot g)$ , the effect of even very high levels of rent extraction is diminutively small.

Nevertheless, even with  $\sigma$  not playing a role, centralization is more likely to occur under a representative regime if under direct democratic centralization  $p \neq 1/2$ . It follows from

*Lemma 3* that the range of spillovers for which centralization is commonly preferred in both jurisdictions will be maximized if  $p = 1/2$ . There are, though, many reasons that may lead to unequal winning probabilities for the two spending proposals: there may be differences in the culture of political participation, the costs of getting to the ballots may be higher in a more rural compared to a more urban jurisdiction and so on. In a direct democracy, where a majority of the entire electorate decides, it is hardly feasible to shape formal political institutions in order to manipulate  $p$ . Under representative democracy, on the other hand, instruments to manipulate  $p$  such as gerrymandering are available. If this is possible, then under representative democracy the range  $[\gamma^*, 1]$  where centralization is favored can be extended by finding formal political institutions for the central level that ensure that  $p$  converges towards  $1/2$ . These considerations, along with Lemmas 1-4, lead to

*Proposition 1.* Representatives are more inclined to favor centralization of spending competencies than voters in direct-democratic decision-making, since

- (i) under cooperative central decision-making, the prospect of additional rent-extraction makes the centralized solution relatively more alluring to representatives than to citizens and
- (ii) under non-cooperative central decision-making, a representative system allows for the adjustment of  $p$  via the choice of appropriate formal institutions in the case that  $p \neq 1/2$  at the outset.

Obviously, the representatives' tendency to centralize may be mitigated by influences not formally considered here, such as the threat of punishment through retrospective voting. But since direct democracy leads to tighter control of politicians compared to representative democracy (see again the reviews by FELD and KIRCHGÄSSNER, 2000, KIRCHGÄSSNER, FELD and SAVIOZ, 1999, MATSUSAKA, 2004), such mitigating influences do not principally threaten our result: Representative democracy offers the necessary niches to centralize against the will of the median voter, e.g. by centralizing at the beginning of a term and hoping for prospective or myopic voting in the next elections, or by accompanying an unpopular centralizing decision with a popular decision elsewhere.

### III. Anecdotal Evidence

There is indeed some anecdotal evidence supporting *Proposition 1*. As referendums on European integration in 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 Un

ion 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 small. Danish voters obviously opposed a further centralization of competencies to the EU level. Government centralization is also of practical relevance in Swiss politics, as two examples may illustrate: the canton of Fribourg which 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 the cantonal parliament of Fribourg already passed a law to encourage communal mergers. In 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 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 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 *Proposition 1*. The power of the federal government in Switzerland is very limited. Federal tasks have to be explicitly enumerated in the federal constitution. Unlike in Germany, the Swiss constitution does not make use of a concurrent legislation. Centralization of responsibilities has to be approved in a referendum requiring a double majority of the Swiss citizens and of the cantonal electorates. In 2001, 32.6 percent of total (federal, cantonal and local) spending was undertaken by the federal government, 40.7 percent by the cantonal level and 26.6 percent by the local level. There are corresponding figures for public revenue. 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 doesn't exist such a far-reaching tax shar

ing agreement between Swiss jurisdictions as in Australia, Austria or Germany. Cantons and local jurisdictions, though to a lower extent, have discretion on personal and corporate income tax rates (FELD and SCHNEIDER, 2001). Similarly, cantons decide upon their infrastructure autonomously. Even social welfare is autonomously determined by the local and state levels.

As *Appendix D* 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 Zurich 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 Uri. 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 (*Appendix C*).

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), see *Table 1*) 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, 2003). Proposals can be initiated 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.



**Table 1: The spending thresholds for fiscal referendums 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); FREY, B.S. and 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> 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).

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

In the context of our analysis, the impact of fiscal referendums on policy decisions of sub-national governments is of interest. There exists no fiscal referendum on the central level, but with the exception of the canton of Vaud (VD)<sup>6</sup> all cantons know a derivative of the fiscal referendum. Of the remaining 25 cantons, 13 have a mandatory as well as an optional fiscal referendum. In seven other cantons (BE, BS, BL, AG, TI, VS, GE) only the optional fiscal referendum is possible, whereas in SZ, GL, ZG, AR, NE budget resolutions have to pass the

<sup>6</sup> Laws that affect public spending are subject to an optional legislative referendum in the canton of Vaud (VD).

mandatory, but not the optional fiscal referendum. The fiscal referendum can be differentiated according to five categories: the fiscal 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 fiscal 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 fiscal referendum. Thus, the institutional variation on the Swiss sub-federal level provides a laboratory to investigate the impact of fiscal referendums on government centralization.

## V. Empirical Model

In order to test *Proposition 1*, arguing that fiscal 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 cantons while the sub-central level is represented by the local jurisdictions. The model can be written as follows

$$ES_{it} = \alpha_1 + \beta_1 R_{it} + \gamma_1 T_{it} + \delta_1 X_{it} + \varepsilon_{1it} \quad (11)$$

$$RS_{it} = \alpha_2 + \beta_2 R_{it} + \gamma_2 T_{it} + \delta_2 X_{it} + \varepsilon_{2it} \quad (12)$$

where  $ES_{it}$  denotes the share of real cantonal expenditure (structure) in percent of total state and local expenditure in equation (11) and  $RS_{it}$  represents the respective real revenues (structure) in equation (12).  $R_{it}$  is a vector of variables capturing direct democracy at the cantonal level,  $T_{it}$  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 (see *Appendix B* 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 (see *Appendix C* for summary statistics).

As stated by OATES (1972) and PANIZZA (1999) the quantification of government centralization is no easy task. Cross-country comparisons of expenditure and revenue ratios on the federal level could inaccurately measure 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, the fiscal constitution of Switzerland comes close to the principle of fiscal equivalence, implying that people paying and consuming public goods are also those who decide upon it (SCHALTEGGER and FREY, 2003). Thus, the Swiss data on centralization of public finances should 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. 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. All in all we believe to have a useful proxy reflecting government centralization.<sup>7</sup>

In order to capture the theoretical model formulated above, the econometric model needs to comprise three classes of variables: Measures of direct democracy, proxies that capture elements of fiscal federalism, in particular those coming close of controlling spillover effects and preference homogeneity, and political variables that could proxy potential deviations of representative from direct democracy. There are *three variables of direct democracy*. To consider the institutional impact of fiscal referendums on government centralization we use a dummy

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<sup>7</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.

variable of *mandatory cantonal fiscal referendums*  $R_{it}$ . According to *Proposition 1*, this variable should exhibit a negative sign. In addition the *spending thresholds* for mandatory fiscal referendums (per capita) are included in the model. According to the rules in the Swiss cantons, a mandatory (binding) fiscal referendum must be held if a spending project exceeds a pre-specified amount. Only if the project is larger than such a threshold, the fiscal referendum can be binding. The higher that amount the less restrictive fiscal referendums can be. A positive sign is thus expected for this variable. Moreover, the *signature requirements for legislative initiatives* (per capita) are included. The higher that signature requirement the more difficult it is to bring an initiative to the ballots. The role of the initiative in the question of fiscal centralization is however less clear-cut than that of the referendum. While the latter is a veto instrument, the initiative could be used to change the status quo. With respect to fiscal centralization, this possibility implies that initiatives could be started to centralize or to decentralize policies depending on the status quo. The signature requirement could thus have a positive or a negative sign. If it turns out to be positive, the initiative restricts fiscal centralization. The initiative and the fiscal referendum are substitutes then. If it has a negative sign, the initiative is used to enhance the responsibilities of the cantonal level. The initiative and the fiscal referendum are complements then.

The theoretical model implies that the expenditure (revenue) structure is a function of *fiscal federalism*, measured by the vector  $T_{it}$ . All in all, six variables could be subsumed under this heading. According to BESLEY and COATE (2003) and REDOANO and SCHARF (2004) centralization depends on preference heterogeneity at the local level, but it could also result from tax competition or economies of scale in the provision of government services (LOCKWOOD 2004). 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 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 more citizens may want to centralize 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 political pressure for centralization in particular with respect to spending and revenue components which are strongly aimed at redistributing income, like 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 is either the result of a tax competition game between the different jurisdictions, and thus their response to differential mobility of production factors (WILDASIN and WILSON, 2004), or 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*, *ratio of urban population* and *fragmentation* (number of communes) capture (the lack of) 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. On the other hand PEROTTI and KONTOPOULOS (2002) make use of the total number of *ministers in the cabinet* as a proxy for common pool problems. Therefore, the number of cantonal ministers is additionally included in the model. The severance of the common pool problem is mitigated by fiscal federalism.

The remaining variables included in the model are standard controls. Real *cantonal income* per capita is used to find out whether more centralization is demanded in cantons with higher income. 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 (2003) present evidence for Switzerland that fiscal preferences measured by fiscal 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 fiscal 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. Following BESLEY and CASE (2003), we estimate the models by OLS with robust standard errors. The results for state means are also (partly) reported. The estimation of equations of the spending and revenue structure raises additional econometric issues. Since the centralization ratios vary between zero and one and are therefore censored, they are transformed to log odds. In addition, a careful analysis of outliers is undertaken. As can be seen by the Jarque-Bera test in *Table 2* this condition is violated with respect to most estimates. Thus, we 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.

**Table 2: Log odds 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
Fiscal referendum	-0.203*** (-2.93)	-0.161*** (-3.35)	-0.195*** (-2.90)	-0.156*** (-3.23)	-0.114 (-1.43)	-0.133** (-2.59)
Spending Threshold	0.003** (2.64)	0.003** (2.69)	0.003** (2.49)	0.003** (2.47)	0.002 (1.37)	0.001* (1.76)
Signature Requirement	2.289 (0.58)	0.207 (0.07)	1.963 (0.52)	-0.050 (-0.02)	3.548 (0.57)	3.854 (1.20)
Homogeneity	0.195 (1.20)	0.069 (0.60)	0.157 (0.97)	0.029 (0.27)	0.599 (1.59)	0.026 (0.46)
Tax competition	0.031** (2.69)	0.033*** (3.01)	0.030** (2.74)	0.033*** (3.05)	0.003 (0.18)	0.018*** (2.81)
Lump-sum grants <sup>▼</sup>	0.009* (0.05)	-0.097 (-0.62)	0.072 (0.38)	-0.031 (-0.19)	-0.216 (-1.10)	-0.334*** (-3.49)
Ratio of urban population	-0.426 (-1.64)	-0.122 (-0.65)	-0.474* (-1.89)	-0.175 (-0.97)	-0.530 (-1.35)	0.073 (0.50)
Population <sup>▲</sup>	-0.085 (-0.73)	-0.057 (-0.41)	-0.062 (-0.53)	-0.037 (-0.27)	0.037 (0.32)	0.046 (0.44)
Fragmentation <sup>▼</sup>	-0.732 (-1.70)	-0.526 (-1.37)	-0.784* (-1.82)	-0.579 (-1.51)	-0.959** (-2.07)	-0.610* (-1.84)
Minister	0.093*** (3.49)	0.078*** (2.85)	0.091*** (3.39)	0.076** (2.80)	0.047* (1.85)	0.034* (1.81)
Cantonal income <sup>▼</sup>	-0.353 (-0.63)	-0.304 (-0.86)	-0.382 (-0.70)	-0.341 (-0.99)	0.710 (0.89)	0.017 (0.06)
Coalition	0.076* (1.87)	0.010 (0.39)	0.072* (1.78)	0.007 (0.26)	0.092 (1.60)	-0.012 (-0.57)
Ideology	-0.044 (-1.07)	-0.047 (-1.54)	-0.042 (-1.06)	-0.045 (-1.54)	-0.096 (-1.68)	-0.081** (-2.77)
Language	-0.152 (-1.13)	-0.220** (-2.43)	-0.163 (-1.24)	-0.225** (-2.54)	-0.275 (-1.48)	-0.165** (-2.21)
Dummy Basel-Stadt	1.568*** (11.96)	1.542*** (14.28)	1.605*** (12.36)	1.577*** (14.64)	1.452*** (7.66)	1.279*** (16.85)
Dummy Uri	-	0.468*** (10.16)	-	0.457*** (10.18)	-	0.376*** (6.90)
Dummy Glarus	-	0.336*** (5.27)	-	0.334*** (5.38)	-	0.970*** (14.14)
Dummy Uni-Kantone	-	-0.025 (-0.30)	-	-0.020 (-0.25)	-	-0.006 (-0.10)
Observations	494	494	494	494	494	494
R <sup>2</sup>	0.852	0.912	0.856	0.914	0.770	0.950
Jarque-Bera	45.159***	2.007	134.041***	4.929*	126.238***	0.006

*Note:* Government centralization stands for the state share of state and local expenditures. t-values are given in parentheses. They are computed with robust standard errors according to the clustering method using STATA 7.0. 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 3: Log-odds estimates for government centralization, expenditure structure, 26 Swiss cantons, 1980-1998</b>										
Variable	Administration	Security	Culture and recreation	Health	Welfare	Education	Finance	Traffic	Economy	Environment
Fiscal referendum	-0.225 (-0.41)	-0.050 (-0.77)	0.078 (0.78)	-0.797*** (3.80)	-0.228** (-2.08)	-0.216** (-2.11)	-0.173 (-1.52)	0.067 (0.81)	-0.223** (-2.12)	-0.117 (-1.11)
Spending Threshold	0.001 (0.49)	0.002 (1.48)	-0.000 (-0.12)	0.025*** (4.22)	0.001 (0.22)	0.004* (1.71)	-0.004 (-1.62)	-0.000 (-0.19)	0.002 (0.64)	0.006** (2.45)
Signature Requirement	-4.086 (-1.03)	-2.634 (-0.46)	-0.382 (-0.06)	-12.081 (-0.88)	-12.711* (-1.97)	12.546* (2.05)	12.184 (1.37)	-6.750 (-1.44)	21.170** (2.53)	-11.909 (-1.45)
Homogeneity	0.005 (0.05)	0.361* (1.75)	-0.031 (-0.17)	0.510 (0.85)	0.304 (1.44)	0.405** (2.63)	-0.476* (-1.74)	-0.182 (-0.80)	-0.114 (-0.30)	0.141 (0.61)
Tax competition	0.029** (2.14)	0.031** (2.58)	0.010 (0.48)	0.234*** (4.26)	0.031 (1.26)	0.060*** (3.79)	-0.026* (-1.84)	-0.024 (-1.63)	-0.035 (-1.45)	0.042* (1.94)
Lump-sum grants ♡	-0.022 (-0.14)	-0.136 (-0.47)	0.187 (0.75)	-2.477*** (-3.37)	-0.227 (-0.76)	0.084 (0.26)	-0.346 (-1.02)	0.021 (0.09)	-0.148 (-0.35)	0.583** (2.23)
Ratio of urban population	-0.241 (-1.03)	-0.091 (-0.28)	0.219 (0.60)	-1.302 (-1.53)	0.073 (0.18)	-0.111 (-0.29)	-0.430 (-1.00)	-0.263 (-1.06)	0.910** (2.09)	0.382 (0.83)
Population ▲	-0.100 (-0.58)	-0.033 (-0.17)	-0.194 (-0.93)	-0.177 (-0.25)	-0.359 (-1.38)	0.358 (1.43)	0.100 (0.49)	0.078 (0.55)	-0.456 (-1.54)	-0.022 (-0.07)
Fragmentation ♣	-0.245 (-0.60)	-0.644 (-1.02)	1.151** (2.46)	-5.363** (-2.29)	0.888 (1.55)	-0.350 (-0.44)	-2.124*** (-3.93)	-1.118** (-2.69)	-0.004 (-0.00)	0.006 (0.01)
Minister	0.033 (1.25)	0.092*** (2.82)	0.070 (1.42)	0.311** (2.25)	0.021 (0.49)	0.181*** (3.12)	0.106*** (3.08)	0.019 (0.57)	0.254*** (3.27)	0.125*** (2.82)
Coalition	-0.038 (-1.09)	-0.007 (-0.21)	0.052 (1.22)	-0.086 (-0.61)	-0.132** (-2.29)	0.081* (1.81)	0.075 (1.42)	-0.001 (-0.02)	0.009 (0.12)	-0.054 (-0.89)
Cantonal income ♣	0.439 (0.88)	-0.076 (-0.15)	-0.753 (0.99)	2.903* (1.80)	0.087 (0.11)	-0.823* (-1.84)	-0.636 (-0.67)	-0.115 (-0.16)	-0.652 (-0.83)	-0.823 (-0.97)
Ideology	0.003 (0.07)	-0.027 (-0.47)	0.078 (1.23)	-0.401** (-2.62)	0.089 (1.24)	-0.037 (-0.54)	-0.074 (-0.99)	-0.034 (-0.92)	-0.004 (-0.05)	0.052 (0.60)
Language	-0.177 (-1.50)	-0.277* (-1.75)	-0.027 (-0.14)	-0.692 (-1.22)	-0.720*** (-3.12)	-0.429* (-2.00)	0.265 (0.96)	-0.628*** (-4.17)	0.001 (0.00)	-0.416** (-2.12)
Dummy	1.229*** (9.29)	2.242*** (14.74)	1.963*** (8.83)	0.469*** (0.89)	1.426*** (5.72)	1.409*** (6.65)	1.167*** (5.03)	1.314*** (8.71)	-0.456* (-1.80)	1.904*** (7.99)
Controlling outliers	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	494	494	494	494	494	494	494	494	494	494
R <sup>2</sup>	0.814	0.871	0.765	0.722	0.794	0.828	0.596	0.711	0.576	0.767

For notes see Table 2.



<b>Table 4: Log-odds estimates for government centralization, revenue structure, 26 Swiss cantons, 1980-1998</b>						
Variable	User Charges	Tax on income and property (wealth)	Tax on property (wealth)	Tax on income	Tax on profits	Tax on capital
Fiscal referendum	-0.444*** (-3.98)	-0.134** (-2.68)	-0.085* (-1.85)	-0.110** (-2.56)	-0.486 (-0.65)	-0.460 (-0.62)
Spending Threshold	0.011*** (3.32)	0.002** (2.14)	0.003*** (3.66)	0.003*** (3.84)	-0.025 (-1.14)	-0.025 (-1.13)
Signature Requirement	-2.918 (-0.33)	3.871 (1.22)	2.862 (1.01)	3.520 (1.09)	22.957 (0.56)	23.362 (0.57)
Homogeneity	0.472** (2.37)	0.021 (0.31)	0.072 (1.14)	0.039 (0.62)	-1.166 (0.95)	-1.249 (-1.02)
Tax competition	0.082*** (3.34)	0.019*** (3.11)	0.022*** (3.35)	0.024*** (3.98)	-0.194 (-1.52)	-0.195 (-1.54)
Lump-sum grants ♡	-1.141** (-2.78)	-0.312** (-2.81)	-0.197* (-1.90)	-0.339*** (-3.38)	2.857 (1.36)	2.937 (1.41)
Ratio of urban population	-0.851* (-1.85)	0.071 (0.47)	0.301* (1.94)	0.317* (2.08)	-8.458* (-1.95)	-8.447* (-1.96)
Population ▲	-0.115 (-0.33)	0.054 (0.52)	-0.044 (-0.43)	-0.031 (-0.32)	3.618* (1.80)	3.645* (1.82)
Fragmentation ♣	-1.972 (-1.67)	-0.615* (-1.88)	0.007 (0.02)	-0.096 (-0.31)	-17.015* (-1.97)	-17.030* (-1.98)
Minister	0.191** (2.51)	0.032* (1.71)	0.026 (1.32)	0.035* (1.94)	-0.500 (-1.45)	-0.500 (-1.46)
Coalition	0.007 (0.09)	-0.016 (-0.75)	-0.020 (-0.88)	-0.016 (-0.75)	-0.468 (-1.32)	-0.484 (-1.37)
Cantonal income ♣	1.704** (2.17)	0.052 (0.19)	0.448 (1.64)	0.253 (1.04)	-3.085 (-0.61)	-3.104 (-0.62)
Ideology	-0.095 (-1.17)	-0.084** (-2.75)	-0.070** (-2.50)	-0.057** (-2.18)	-1.147* (-1.76)	-1.171* (-1.81)
Language	-0.249 (-0.70)	-0.163** (-2.28)	-0.223** (-2.86)	-0.201** (-2.61)	0.782 (0.52)	0.761 (0.51)
Dummy	1.274*** (4.36)	1.284*** (17.15)	8.790*** (113.25)	0.878*** (11.79)	4.167*** (2.45)	10.947*** (6.45)
Controlling outliers	Yes	Yes	Yes	Yes	Yes	Yes
Observations	494	494	494	494	494	494
R <sup>2</sup>	0.767	0.935	0.997	0.945	0.550	0.756
For notes see Table 2.						

## VI. Results

In *Tables 2 to 4*, 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. The regressions in *Tables 2 to 4* indicate that the model performs relatively well according to the  $R^2$ . 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. It is interesting to note that, in addition to the canton of Basle-City, the cantons of Uri and Glarus can be frequently identified as outliers. Glarus is 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. Excluding the outliers from the regressions does not change the main results. We thus proceed in *Tables 3 and 4* by excluding the outliers from the beginning and do not report the J.-B. test statistics anymore.<sup>8</sup>

The results in *Table 2* indicate that our theoretical considerations are confirmed for total revenue and total spending. The dummy for fiscal referendums has the expected negative sign and is significant at the 1 percent level. Cantons with fiscal referendums in their constitutions centralize total spending and total revenue to a lesser extent to the cantonal level than those without fiscal referendums. Cantons with fiscal 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 and total revenue centralization, we thus find encouraging evidence supporting *Proposition 1*. In the case of tax revenue, the fiscal referendum variable does not prove to be significant. This is however mainly the case because of the very high centralization of taxation in the canton of Glarus. Controlling for that outlier and in addition for the canton of Uri, the fiscal referendum dummy becomes significant at the 1 percent level as well. The impact of the fiscal referendum dummy on government centralization is in general robust to an analysis of outliers and to the inclusion of a dummy variable for the cantons with universities. Its significance is increased when outliers are taken into account and the size of the coefficient changes somewhat.

The influence of fiscal referendums on fiscal centralization is further qualified by the estimates on the spending threshold. As expected, the spending threshold has a positive impact and is significant at the 5 percent level in the spending and revenue equations whether outliers are controlled for or not. In the case of tax revenue, the control of outliers induces the spend

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<sup>8</sup> The results including the outliers can be obtained from the authors upon request.

ing threshold to become significant at the 10 percent level. The higher the spending threshold and thus the less restrictive the fiscal referendum, the more centralized is spending, revenue and tax revenue. Finally, the signature requirement for the legislative initiative does not have any significant impact in any of the six equations presented in *Table 2*. As a further robustness check, we have estimated the same models with between canton effects. This specification must be considered carefully because there are only 26 Swiss cantons such that a degrees of freedom problem emerges. In several variations the fiscal referendum dummy still proves to be significant at the 10 percent level at least and keeps the negative sign. Fiscal referendums restrict fiscal centralization.<sup>9</sup>

The same result holds, though to a lesser extent, with respect to the budgetary structure of government activities, as the results in *Tables 3* (controlling for outliers and including the dummy variable for university cantons) indicate. On the expenditure side, fiscal referendums are associated with a significantly lower centralization in the case of spending for health, welfare, education and the economy (including agricultural subsidies). Centralization of administration, security, culture and recreation, finance and environmental expenditures are not significantly affected by fiscal referendums. Since the spending categories where fiscal referendums have a restrictive impact are the most important ones, it can be concluded that the fiscal referendum exerts the expected restrictive impact on policy centralization.<sup>10</sup> The spending threshold reaches conventional significance levels only in the health, education and environmental spending equations. It has the expected positive sign in these equations. The signature requirement for legislative initiatives has an ambiguous impact on different spending categories. The higher the signature requirement (and the less easy an initiative could make it to the ballots), the more centralized is education and economy spending, the less centralized is however welfare spending. While the fiscal referendum and the initiative are substitutes in the case of education and economic policy, they are complements in the case of social policy.

The results for the revenue structure in *Table 4* (again controlling for outliers and university cantons) indicate that cantons allowing for a great extent of fiscal referendums are less cen

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9 Because of the degrees of freedom problem, the full model from *Table 2* could not be used to estimate between canton effects (canton means). These estimates are thus not explicitly shown in the paper. They can be obtained from the authors upon request. – The estimates for the fiscal referendum dummy are 0.246 (t-statistic 1.85) for spending, 0.235 (t-statistic 1.81) for revenue and 0.259 (t-statistic 2.17) for tax revenue. See BESLEY and CASE (2003) for the method.

10 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.

tralized on the cantonal level as far as user charges and the different kinds of taxes are concerned. The fiscal referendum dummy has again the expected negative sign and is significant at the 1 percent level in the case of centralization of user charges. It is significant at the 5 percent level with the expected negative sign in the case of centralization of income and property (wealth) taxes. The property (wealth) tax component is only significantly influenced by the fiscal referendum at the 10 percent level. Profit and capital tax centralization are not significantly influenced by the fiscal referendum. The spending threshold has the expected positive impact and is significant in the same revenue categories as the fiscal referendum dummy. The signature requirement for the legislative initiative does not have any significant influence on revenue centralization. Since the most important indirect taxes, the VAT and the mineral oil tax, are in the power of the federal government in Switzerland, we cannot say anything about centralization of indirect taxes. In addition, unimportant tax sources at the Swiss sub-federal level like car and dog taxes are not considered because they are usually centralized to the cantonal level. Finally, inheritance taxes are not considered because they are (nearly) pure cantonal taxes as well. These results strongly support *Proposition 1*.

The control variables for the extent of fiscal federalism exhibit an interesting pattern. Most of them are not significant in the equations or do not have a consistent impact across spending and revenue structure. This already holds for homogeneity measured as the ratio of median to mean income. It does not have any significant impact on the centralization of total spending, total revenue or tax revenue whether outliers are controlled for or not (*Table 2*). As *Tables 3* and *4* indicate, a higher income homogeneity is significantly associated with more centralization in the case of security and education expenditure as well as revenue from user charges, but with less centralization in the case of finance spending. All in all, income homogeneity does therefore not have a consistent impact on centralization of government activities in Switzerland. These results do neither support the traditional tax competition hypothesis that decentralized redistribution is impossible, nor the 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 centralized.

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 decentralized taxes and spending are to the local level. This holds for general revenue, tax revenue and general spending (*Table 2*). With respect to the spending structure this decentralizing impact of tax competition holds especially for administration, security, health, education, and environmental spending whereas there is a centralizing impact in the case of finance spending (*Table 3*). With respect to revenue structure, there is a robust, significant impact of tax competition on the decentralization of user charges and the different kinds of tax revenue (*Tables 4*) with the exception that the centralization of profit and capital taxes is not significantly influenced by tax competition. The more the other competing cantons increase their tax burden, the more taxes are centralized to the cantonal level. Cantons with a relatively bad situation in the tax competition game shift taxes and spending to the local level in order to be bailed-out by their communities. This is a rather short-sighted strategy given that income tax competition is more intense at the local than at the cantonal level (FELD and KIRCHGÄSSNER, 2001a).

Economies of scale do obviously not play an important and consistent role in the centralization process at the Swiss cantonal level. The higher the share of urban population in the whole population, the less centralized is total revenue (marginally significant at the 10 percent level) (*Table 2*), revenue from user charges, profits and capital tax revenue (*Table 4*), and the more centralized is property (wealth) and income tax revenue as well economy expenditure (*Table 3*). Moreover, the population size of the canton and fragmentation of a canton in many small communities do not have consistent or robust impacts on centralization. Although there is a significantly negative impact of the variable 'geographical fragmentation' on centralization of total revenue and tax revenue, the impact of geographical fragmentation is not robust to the control of outliers and university cantons in these cases. There are also very differentiated results depending on the spending and revenue category. Fragmentation is significantly positively affecting centralization of culture and recreation spending as well as profit and capital tax revenue. It is however negatively influencing the centralization of income and property (wealth) tax revenue as well as spending for health, finance and traffic. This 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. 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 does not support this hypothesis in the Swiss case. The higher lump sum grants, the less centralized are the different tax categories (*Table 4*) while there is only a marginally significant higher centralization due to lump-sum grants in the case of total spending.

From the remaining control variables, the ministers and coalition variables are particularly interesting. The higher the number of ministers, the higher is centralization of government activity.<sup>11</sup> This holds for total spending and revenue centralization (significant at the 1 percent level) as well as for tax revenue (significant at the 10 percent level), but also for user charges, taxes on income and property (wealth), in particular income taxes, as well as security, health, education, finance, economy and environmental expenditure. Aside the fiscal referendum dummy and the tax competition variable, this is thus the variable with the most consistent impact on fiscal policy centralization in the Swiss cantons. As assumed in the theoretical model, the common pool problem induced by a higher number of ministers in the cabinet provides incentives for fiscal policy centralization in order to secure the political rents captured. 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 and robustly hold for total spending or revenue or for the spending and revenue categories. In most cases this variable is not significant.

The remaining control variables, ideology, language and cantonal income do not exhibit consistent and clear-cut impacts on centralization of different tax categories as well as general revenue. They are mostly insignificant. Only in the case of the revenue categories, it can be concluded that cantons with leftist governments have less centralization for most of the tax revenue categories.

## **VII. Conclusions**

In this paper, an empirical test is performed as to whether fiscal referendums prevent centralization of government activity. On the basis of a theoretical model in the spirit of BESLEY and COATE (2003), we have shown that the degree of centralization is lower under direct than under representative democracy. If spillovers of public goods between two jurisdictions exist and individual preferences in the jurisdictions are sufficiently homogeneous, citizens have incentives to centralize policies. Compared to elected representatives, centralization is how

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<sup>11</sup> This result remains robust when we perform IV estimates using instruments for the ministers variable. The overall results do not change by this specification.

ever lower under direct democracy because the common pool problem is more severe in representative democracy and it is likely that representatives extract political rents. This is anticipated by the voters. With direct democratic institutions on the central level, implying non-cooperative decision-making, voters face additional uncertainty, not knowing precisely ex ante which position the median voter will have in the newly shaped electorate. In a representative system, the uncertainty about the outcome of the centralized political process can be reduced, for instance by gerrymandering. Both arguments together imply that centralization is more likely to be agreed upon by local representatives compared to local median voters.

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 fiscal 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 decentralized to the local level.

From a positive perspective, referendums are associated with less centralization of government activities. This does however not imply any particular normative interpretation. The models of REDOANO and SCHARF (2004) or LOCKWOOD (2004) for example start from the perspective that centralization is useful due to inter-jurisdictional externalities or economies of scale while BESLEY and COATE (2003) and PERSSON and TABELLINI (2000) underline the negative effects of political failures. 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. This must be left to future research.

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## Appendix A

*Proof* of Lemma 2. In a first step, we will show that for  $p = 1$ , centralization is preferred for any level of spillovers. If  $\gamma = 1$ , the first order conditions from Section 2 always lead to  $g_i^{Nm} = g_j^{Nm}$ . The symmetry assumption ensures that  $g_i^D = g_j^D$ . Then, (9) collapses to

$$2[b(g_i^{Nm}) - b(g_i^D)] > g_i^{Nm} - g_i^D \quad (13)$$

$$\Rightarrow \frac{b(g_i^{Nm}) - b(g_i^D)}{g_i^{Nm} - g_i^D} > \frac{1}{2} \quad (14)$$

which is always true, since at  $g_i^{Nm}$ ,  $\partial b(g)/\partial g = 1/2$ , and the slope of the secant necessarily assumes a higher value than that. If  $\gamma = 0$ , (9) collapses to

$$b(g_i^{Nm}) - b(g_i^D) > \frac{g_i^{Nm}}{2} - g_i^D \quad (15)$$

Adding  $g_i^{Nm}/2$  to each side and sorting leads to

$$\frac{b(g_i^{Nm}) - b(g_i^D)}{g_i^{Nm} - g_i^D} > 1 - \frac{g_i^{Nm}}{2(g_i^{Nm} - g_i^D)}. \quad (16)$$

Since  $g_i^{Nm} > g_i^D$ , the right hand side can be rewritten as

$$1 - \frac{zg_i^D}{2g_i^D(z-1)} \rightarrow 1 - \frac{z}{2(z-1)} \text{ with } z > 1 \quad (17)$$

For any  $z \in (1, \infty]$ , the right hand side never assumes a value higher than  $1/2$ . The inequality is always true and for  $\gamma = 0$ , centralization will always be preferred if  $p = 1$ . Concerning other values of  $\gamma$ , there is a complication as far as the benefits of centralization are not necessarily strictly monotonously rising with  $\gamma$ . Let

$$v = b(g_i^{Nm}) - b(g_i^{Dm}) + \gamma [b(g_j^{Nm}) - b(g_j^{Dm})] \quad (18)$$

denote the expected benefits and

$$w = \frac{1}{2}(g_i^{Nm} + g_j^{Nm}) - g_i^{Dm} \quad (19)$$

denote the expected additional costs from centralization. Then we have

$$\frac{\partial w}{\partial \gamma} = \frac{1}{2} \frac{\partial g_j^{Nm}}{\partial \gamma} \quad (20)$$

which, given the first order conditions, is necessarily positive. On the other hand,

$$\frac{\partial v}{\partial \gamma} = b(g_j^{Nm}) - b(g_j^{Dm}) + \gamma \frac{\partial b(g_j^{Nm})}{\partial g_j^{Nm}} \frac{\partial g_j^{Nm}(\gamma)}{\partial \gamma} \quad (21)$$

which, after inserting the first order condition, can be written as

$$\frac{\partial v}{\partial \gamma} = b(g_j^{Nm}) - b(g_j^{Dm}) + \frac{1}{2} \frac{\partial g_j^{Nm}(\gamma)}{\partial \gamma}. \quad (22)$$

Because the difference between the first two terms will be negative for small  $\gamma$  and because, as can be inferred from the first order conditions,  $g_j^{Nm}(\gamma)$  is either convex with a relatively flat slope for small values of  $\gamma$ , or linear,  $v$  may be declining in an interval  $(0, \bar{\gamma}]$  and rises monotonously thereafter.

With  $v(\gamma)$  being convex,  $w(\gamma)$  rising strictly monotonously and  $v(0) > w(0)$  as well as  $v(1) > w(1)$ , it is a necessary condition for  $v(\gamma) < w(\gamma)$  at any  $\gamma \in (0, 1)$  that  $v(\hat{\gamma}) < w(\hat{\gamma})$  with  $\hat{\gamma}$  being exactly that value of  $\gamma$ , where the slopes of  $w$  and  $v$  are identical. Equating both partial derivatives yields the condition that  $b(g_j^{Nm}) = b(g_j^{Dm})$ , which is the case exactly at  $\hat{\gamma} = 1/2$ . Equating  $v(\hat{\gamma})$  and  $w(\hat{\gamma})$  and keeping in mind that in this case,  $g_j^{Nm} = g_{i,j}^{Dm}$ , we find that  $v(\hat{\gamma}) > w(\hat{\gamma})$  if

$$\frac{b(g_i^{Nm}) - b(g_i^{Dm})}{g_i^{Nm} - g_i^{Dm}} > \frac{1}{2}, \quad (23)$$

which is always the case, since once again the left hand side is the slope of the secant and can, due to our first order conditions, not be smaller than  $1/2$ . Therefore, for  $p = 1$ , centralization is preferred irrespective of the degree of spillovers.

The next step is to show that even for  $p = 0$ , it is possible that centralization is preferred. For this purpose, it is sufficient to look at (9), where it is obvious that with  $\gamma = 1$ , the left hand

side of the inequality assumes the same value at  $p = 0$  and at  $p = 1$ . Therefore, the argument that has been made for  $p = 1, \gamma = 1$  is also valid for  $p = 0, \gamma = 1$ .

*Proof* of Lemma 4. Taking into consideration that, due the symmetry assumptions,  $g_i^C = g_j^C$  and  $g_i^{Dr} = g_j^{Dr}$ , (10) can be written as

$$\frac{(b(g_i^C) - b(g_i^{Dr}))}{g_i^C - g_i^{Dr}} > \frac{\sigma}{1 + \gamma}. \quad (24)$$

Let  $\alpha(\sigma)$  denote the slope of the secant between  $g_i^C$  and  $g_i^{Dm}$  in the direct democracy case (i.e., the left hand side of (8)), and  $\beta(\sigma)$  denote the slope of the secant between  $g_i^C$  and  $g_i^{Dr}$  in the case of representative democracy. Then, under direct democracy, centralization will be preferred for any

$$\gamma_1^* > \frac{1}{\alpha(\sigma)} - 1 \text{ with } 1 > \alpha > \frac{\sigma}{2} \quad (25)$$

whereas in a representative democracy,

$$\gamma_3^* > \frac{\sigma}{\beta(\sigma)} - 1 \text{ with } \sigma > \beta > \frac{\sigma}{2} \quad (26)$$

warrants centralization. With  $\sigma = 1$ , the first order conditions for the public goods levels are identical and so are the threshold spillover levels  $\gamma_3^* = \gamma_1^*$ . Due to the strict concavity of  $b(\cdot)$  and the first order conditions for the optimal spending levels, it is necessarily true that for all  $\sigma \in [0, 1), \alpha(\sigma) > \beta(\sigma)$ . For the threshold spillover levels from where centralization is preferred, we know that  $\gamma_1^* > \gamma_3^*$  holds if

$$\frac{1}{\alpha(\sigma)} - 1 > \frac{\sigma}{\beta(\sigma)} - 1 \quad (27)$$

$$\Rightarrow \beta(\sigma) > \sigma\alpha(\sigma). \quad (28)$$

From this it follows that if  $\sigma$  is sufficiently small,  $\sigma < \bar{\sigma}$  with  $\bar{\sigma} = \beta(\sigma)/\alpha(\sigma)$ , then  $\gamma_3^* < \gamma_1^*$  holds. Since both  $\alpha(\sigma)$  and  $\beta(\sigma)$  converge to the same limit with  $\sigma \rightarrow 0$ , there has to exist some  $\sigma > 0$  for which the above inequality holds.

It is easily checked that for some specifications of  $b(g)$ , such as  $b(g) = a \cdot g^\alpha$  with  $a > 0, 0 < \alpha < 1, \bar{\sigma} = 1$  holds, because in this case,  $\sigma\alpha(\sigma)$  is convex with  $\alpha(1) = \beta(1)$  and  $\lim_{\sigma \rightarrow 0} \sigma\alpha(\sigma) = 0$  and  $\beta(\sigma)$  is concave or linear with  $\lim_{\sigma \rightarrow 0} \beta(\sigma) = 0$ .

## Appendix B

<i>Table A1: Data description</i>		
<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
Fiscal Referendum	Dummy variable = 1, if a mandatory fiscal referendum exists, and zero otherwise.	Lutz and Strohmann (1998) and Trechsel and Serdült (1999).
Spending Threshold	Spending threshold for mandatory fiscal referendums in the case of non-recurring expenditures per capita.	Lutz and Strohmann (1998) and Trechsel and Serdült (1999).
Signature requirement	Number of signatures that need to be collected for a legislative initiative per capita of the electorate.	Lutz and Strohmann (1998) and Trechsel and Serdült (1999).
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
Ratio of urban population	Proportion of communes having more than 10'000 inhabitants.	Swiss Federal Statistical Office
Population	Cantonal population	Swiss Federal Statistical Office
Fragmentation	Number of communes in a canton	Swiss Federal Statistical Office
Minister	Number of ministers in cabinet	Own calculations on the basis of data from the cantonal governments.
Coalition	Number of parties in cabinet.	Own calculations on the basis of data from the cantonal governments.
Cantonal income	Real cantonal income per capita	Swiss Federal Finance Administration
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.
Language	Dummy=1 for German speaking cantons	Own calculations

## Appendix C

<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 (wealth)	54.7%	14.0%	24.6%	97.9%
Tax on property (wealth)	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%
Fiscal referendum	0.69	0.46	0	1
Spending threshold	12.01	17.28	0	84.91
Signature requirement	0.015	0.011	0.038	0.002
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
Ratio of urban population	30.6%	24.4%	0.0%	99.5%
Population	258'519	271'073	12'757	1'183'568
Fragmentation	115.5	113.9	3	412
Ministers	6.39	1.22	5	9
Coalition	3.3	0.9	1	5
Ideology	3.3	0.7	2	5
Cantonal income	25.9	5.8	17.7	54.0
Language	73.1%	44.4%	0.0%	100%
<i>Note:</i>				
For a detailed description of the variables see Appendix B.				
All statistics are computed for 494 observations.				
The statistics for revenues, expenditure and lump-sum grants are measured in real terms per capita.				

## Appendix D





