

Galletta, Sergio; Jametti, Mario

Working Paper

How to tame two leviathans? Revisiting the effect of direct democracy on local public expenditure

CESifo Working Paper, No. 3982

Provided in Cooperation with:

Ifo Institute – Leibniz Institute for Economic Research at the University of Munich

Suggested Citation: Galletta, Sergio; Jametti, Mario (2012) : How to tame two leviathans? Revisiting the effect of direct democracy on local public expenditure, CESifo Working Paper, No. 3982, Center for Economic Studies and ifo Institute (CESifo), Munich

This Version is available at:

<https://hdl.handle.net/10419/66874>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

How to Tame two Leviathans? Revisiting
the Effect of Direct Democracy on
Local Public Expenditure

Sergio Galletta
Mario Jametti

CESIFO WORKING PAPER NO. 3982

CATEGORY 1: PUBLIC FINANCE

OCTOBER 2012

An electronic version of the paper may be downloaded

- *from the SSRN website:* www.SSRN.com
- *from the RePEc website:* www.RePEc.org
- *from the CESifo website:* www.CESifo-group.org/wp

How to Tame two Leviathans? Revisiting the Effect of Direct Democracy on Local Public Expenditure

Abstract

We explore how the vertical structure of direct democracy in a federal context affects expenditure decisions of sub-central governments. In so doing we revisit previous research on the effect of direct democratic institution on public policies. Particularly, the effect of upper-level (state) existence of direct democratic control on local expenditure. Empirically we exploit the fact that both states (cantons) and local governments (municipalities) enjoy a high autonomy in setting their degree of direct democracy. This allows us to take into account vertical differences between institutions, i.e. we can distinguish the effect of state direct democracy on local expenditures for municipalities with and without own direct democratic instruments. Considering 119 municipalities belonging to 22 Swiss cantons for the period 1993-2007 we highlight that municipalities without fiscal referenda belonging to cantons with fiscal referenda present higher expenditure, while the effect is much reduced and statistically significantly different for municipalities that also avail of referenda.

JEL-Code: H720, H770, D720, D780.

Keywords: direct democracy, local public expenditure, vertical interaction.

Sergio Galletta
Institute of Economics (IdEP)
University of Lugano
Via G. Buffi 6
6904 Lugano
Switzerland
sergio.galletta@usi.ch

Mario Jametti
Institute of Economics (IdEP)
University of Lugano
Via G. Buffi 6
6904 Lugano
Switzerland
mario.jametti@usi.ch

October 25, 2012

< Tables and figures at end >

We wish to thank Patricia Funk, Stephan Litschig and Tommaso Nannicini for insightful comments. We have also benefited from comments by participants at the 2012 Sinergia Workshops. Financial support from the Swiss National Science Foundation (grants ProDoc - 130443 and Sinergia - 130648) is gratefully acknowledged.

1 Introduction

How can one tame the Leviathan, i.e. politicians expansionary impact on public expenditure beyond what is desired by citizens? The answer appears to be: direct democracy. A vast array of empirical studies have shown a deflationary impact of direct democratic institutions on public expenditures.¹ All of these studies use countries with a federal setting as data sources. Prominently on the list are the U.S.A. and Switzerland. Interestingly however, prior research ignores, fully or partially, the federal setting. In other words, earlier research considers the effect on expenditure of a specific level of government through the existence of direct democratic institutions of this same level of government, or the impact of upper level democratic institutions on lower level expenditures.² The full federal structure and the resulting potential vertical interdependence are never considered.

In this paper we want to go one step further and take into consideration the vertical structure and the resulting potential interdependence inherent in a federation. That is, we analyze the impact of direct democratic institutions on public expenditure at the local level taking into account both the institutional setting at the local and upper level of government. Specifically, we are interested whether the impact of direct democracy at the upper level of government depends on the degree of citizen participation at the local level.

We also see our paper as a complement and extension of the results of some previous research. Feld and Kirchgässner (2001b) find that municipal fiscal referenda reduce municipal public expenditure. Similarly, Feld and Matsusaka (2003) show that this result also holds when looking at the cantonal level. Funk and Gathmann (2011) also find that cantonal fiscal referenda have a negative effect on cantonal expenditure, but they do not find a significant impact on municipal expenditures. This last result is in contrast with Matsusaka (1995)'s previous findings suggesting a positive effect of upper level government on local level expenditure.

We use a newly assembled dataset on Switzerland. It comprises information on public expenditure and institutions for the 119 largest municipalities from 22 of the 26 cantons (states) over the period 1993 to 2007. Switzerland is an ideal empirical background for our focus of research. First, it is a very decentralized country leaving large spending autonomy to both levels of sub-federal jurisdictions. The three levels of the Swiss federation, federal, cantonal (state) and municipal, hold roughly equal shares of public spending, similarly for revenues. Second, all states and most municipalities have the autonomy to define the degree of direct democratic participation in fiscal matters implying an important variation in institutional settings within

¹Among the others Feld and Matsusaka (2003), Feld and Kirchgässner (2001b), Funk and Gathmann (2011) and Matsusaka (1995).

²For example, how referendum in Swiss cantons affect cantonal public expenditure as in Feld and Matsusaka (2003) or how initiative in U.S.A. state affect local expenditure as in Matsusaka (1995).

our dataset. We concentrate on one particular instrument of direct democracy: the mandatory fiscal referendum.

We find that taking the vertical interdependence of direct democratic institutions into account is important. Our data suggest that cantonal fiscal referenda increases municipal public expenditure for localities that do not avail of a referendum, while this expansionary effect is much reduced for municipalities that also have a fiscal referendum.

2 Theoretical Background

There is a continuing and growing interest in exploring the effect of institutions on economic outcomes. The fields of application are vast and varied.³ One aspect that receives particular attention is the discussion on understanding and testing differences in the policy outcome between representative and direct democratic systems. In both systems the citizen delegates power to politicians through elections. While in a representative system the citizen is involved only during elections, in a direct democratic system some political decisions need citizen approval. These two systems should entail the same policy outcome if the median voter theorem holds (Downs, 1957). Nevertheless, representatives' decisions can deviate from citizens' preferences either because politicians seek to maximize their own utility function (Tullock, 1980), or because, despite being welfare maximizers, they are not able to fully apprehend constituents' preferences (Matsusaka, 1992).

Kessler (2005) sets up a model based on the median voter focusing on the asymmetry of information between citizens and politicians. In direct democratic legislation the citizen does not invest in information acquisition because her vote is unlikely to be determinant. In contrast, under representative democracy, the politician finds it profitable to be informed because she has discretionary power. Elected representatives allow the promotion of more efficient policies, even though in a popular vote these policies would be closest to the preferences of a majority.

Gerber (1996) argues that direct democracy is an instrument that reduces the gap between citizen preferences and politician behavior. She considers a spatial model in which the government chooses the point which maximizes its utility. When initiatives can be proposed by an interest group, the government chooses a point which is closer to the one preferred by the median voter. Instead, when there is no threat of the initiative, the government will choose its preferred policy.

Direct democracy can assume two main forms: the referendum and the popular initiative.

³For example: Acemoglu et al. (2001) highlight the relevance of inherited institutions from colonial countries as determinant on income per capita; Aghion et al. (2004) dealing specifically with the effect of political institutions find that democracy positively affects growth.

The main difference between the two is the time in which citizens become part of the legislative process. With referendum citizens are called at the end of the process.

Romer and Rosenthal (1979) explore the agenda-setter model considering a situation with referendum on expenditure. Referendum gives veto power to citizens on representatives' decisions. The central finding is that government expenditures are usually higher than the ones wished by the median voter and never lower. The gap between median voter's preferences and policy outcome is reduced, but policy makers still have the main role in policy formation.

Feld and Kirchgässner (2000) describe how the referendum, contrary to what is suggested by Kessler (2005), can positively affect citizens' information and then political action. Given that in direct democracy voters can decide for themselves, they have an incentive in gathering more information on the issue on the ballot. It also reduces the ability of politicians to pursue their personal goals. Thanks to referendum politicians work is under scrutiny, because citizens are better informed about it.

In the case of popular initiatives citizens' intervention is at the beginning of the legislative process. According to Vatter (2000) it is the most powerful instrument of direct democracy. He investigates the differences between initiative and referendum. He highlights that while referendum needs a first approval by representatives, initiative enables a minority of citizens to impose a popular vote which can go against representative majority.

Other theoretical contributions give insights on how direct and representative democracy differently affect the vertical structure of public good provision.

Redoano and Scharf (2004) show that representative democracy sustains centralization even when direct democracy would not be able to support it, because regional policy preferences are too different. This result is based on a model of two heterogeneous jurisdictions with policy spillovers in which strategic delegation plays a crucial role. Centralization is more likely to occur when the decisions are taken via representative rather than direct democracy. Schnellenbach et al. (2010), reach to the same conclusion by using a different theoretical model.

In essence, most of the theoretical results point to the fact that direct democratic participation of the citizen in the decision making process brings adopted policies closer to the preferences of voters. Further, since politicians have a tendency to increase public expenditure beyond what is socially optimal implies that direct democracy has a reducing effect on expenditure.

But what about a federal setting? What if two levels of government choose the degree of direct democratic participation in public good provision? And what about the vertical interdependence resulting from this.

There is relatively little theoretical work that has explored the vertical interaction among direct democratic institutions. A full theoretical model that identifies the channels that are at work is beyond the scope of this paper. Nevertheless, given the direct effect described above it

is intuitive that the possible combinations of institutional setting might matter and therefore should be accounted for.

For example, consider a federation with two levels of government, say state and local, each with the possibility to allow for direct democratic participation of its citizens. This gives rise to four different cases as illustrated in Table 1. Previous theoretical and empirical studies have only considered cases (a) and (b) and might have introduced bias in their estimates.

When both levels have a referendum then we should observe the lowest level of expenditure for the local government, *ceteris paribus*, since both tiers have the constraint given by citizens' control. If the lower level does not have a referendum and the state does, then one can think of two opposite effects that are at work. On the one hand, citizen control at the upper level of government could allow unconstrained local authorities to extract more rents, which implies a higher local expenditure. On the other hand, local expenditure could be reduced through the possibility of vertical yardstick competition, i.e. citizens can observe the "good" behavior of state authorities and hold local politicians in check, reducing the agency problem.

If vertical interaction matters then, to understand the full effect of direct democracy, one should control for all the tiers of government involved in the spending process. Thus, what we do is to test whether the existence of fiscal referendum in the state (upper level) affects local expenditure decisions and whether this effect varies with local direct democratic participation. This is the theoretical hypothesis we aim to test empirically in this paper.

3 Empirical Background

Pommerehne (1978) was among the first to highlight the negative effect of direct democracy on public expenditure. He used data on Swiss municipalities in the year 1970 to show that the availability of a referendum in a municipality reduces (excess) public service provision. He interprets the results as highlighting that in jurisdictions where decisions are taken directly by voters the policy outcome is closest to the median voter. Hence, agency cost seems to be reduced by citizen intervention.

Matsusaka (1995), using annual data for the period 1960-1990 on U.S. states, uncovers again a negative impact of citizen participation on expenditure. States with statutory initiative have a significantly lower level of expenditure compared to the states that do not. Further, he looks at the effect of upper level direct democracy on lower level expenditure, finding that local expenditure is higher in initiative states. To our knowledge this is the first attempt to, at least partially, address the vertical interdependence of democratic institutions.

Feld and Kirchgässner (2001a,b) study in detail the outcome of several forms of direct democracy on public policy. Using data on 131 Swiss municipalities in the year 1990 they show

that mandatory referendum on budget deficits entails a reduction in public debt, expenditure and revenue. Moreover, using data on 26 Swiss cantons for the period 1986-1997 they find that expenditure and revenue are lower in cantons with a mandatory referendum on new spending projects. They also test the effect of signature requirements for initiatives, i.e. the percentage of the population required to bring an initiative to a ballot, on expenditure, revenue, debt and deficit. They find mixed results. The signature requirement in cantons with referendum increases spending while in canton without referendum it reduces spending and revenue.

Feld and Matsusaka (2003) have another look at Swiss cantonal institutions, this time using data for the period 1980-1998. They consider three variables representing direct democratic institutions: the presence of a mandatory fiscal referendum, the spending threshold that triggers a referendum and the initiative signature requirement. They find a rather important negative effect of referendum. Specifically, cantons with referendum have 19% lower expenditures compared to cantons without referendum. Feld et al. (2008), using the same dataset, test the hypothesis that decentralization is more likely under direct rather than representative democracy. They consider centralization of expenditure, revenue and tax revenue as dependent variables. They confirm, in line with theory, the hypothesis that direct democracy fosters decentralization.

In a more recent contribution, Funk and Gathmann (2011) revisit the previous empirical findings of the direct democratic effect, again focusing on the Swiss case. They gather information on cantonal institutions for the period 1890-2000. The dependent variables are, alternatively, cantonal expenditure, local expenditure and decentralization. The main independent variables are a dummy for the mandatory budget referendum and the initiative signature requirement. They find, in line with theory and the other empirical studies, that referendum reduce expenditure while the signature requirement increases it. Conversely, they highlight that direct democracy does not affect the vertical structure of government, i.e. upper level institutions do not affect lower level expenditure and decentralization, contrary to the findings of Matsusaka (1995) and Feld et al. (2008). They suggest that these results are mainly due to the empirical method. Indeed, Funk and Gathmann (2011), thanks to a long time period, can control for unobserved heterogeneity among jurisdictions using cantonal fixed effects.

As mentioned before, none of the studies above considers the full array of institutional settings that can occur in a federation, which is the main contribution of our paper.

Vertical interaction have also been studied within the tax competition literature.

Besley and Rosen (1998) were among the first that empirically estimated the presence of vertical tax externalities. They analyze tax competition between state and federal government in U.S.A.. They show that changes in excise taxes decided by federal government on goods such as gasoline and cigarettes affect positively the corresponding state taxes.

Brulhart and Jametti (2006) investigate the presence of horizontal and vertical tax external-

ities that arise in the context of overlapping tax bases across levels of government in a federal system. Using a panel data set of Swiss cantons and municipalities, they find that vertical externalities can outweigh horizontal ones.

4 Swiss institutional setting

Switzerland is often praised as a natural laboratory to test theoretical predictions within fiscal federalism.⁴

The country has three levels of government: federal, cantonal and municipal, each with wide ranging autonomy both in expenditure and revenue decisions. For example, during the period 1990-2009 the expenditure (revenue) shares averaged 32% (31%) for federal, 41% (41%) for cantonal and 27% (28%) for local administrations. These shares are quite stable over time.

At the sub-central level each cantonal constitution defines the basic framework for public service provision. Indeed, some services are solely provided by one level of government (cantonal or municipal), while for a considerable range of public goods there is expenditure sharing by both levels of government.⁵ Finally, localities provide some services based on a cantonal mandate. Table 2 presents the contribution, by each level of government, for a disaggregated range of public services.

Municipalities also have large autonomy in setting tax rates within their respective cantonal constitutions. It should be noted that, contrary to many other federations, both sub-central levels of government essentially share the same tax bases, i.e. municipalities' main source of revenues are taxes on personal and corporate income and wealth.

Similarly, all three levels of government have an array of direct democratic instruments at hand in their respective decision making process. Also, in this case there is heterogeneity among cantons and municipalities (see Figure 1). Actually in many small municipalities the citizens' assembly is still the prominent decision making instrument. For large municipalities the two main instruments are the popular initiative and the referendum. We concentrate on the existence of fiscal referenda within a jurisdiction. These can be mandatory or optional. The optional referendum is generally triggered by the collection of a certain number of signatures in a given interval of time, while with the mandatory referendum authorities must hold a referendum to confirm their decision. In Table 3 we show the use of these direct democratic instruments by level of government. The municipal data we report are from Micotti and Bützer (2003) who accounts for 91 municipalities for the period 1990-2000. We see that mandatory referendum is, by far, the most used in the two sub federal jurisdictions.

⁴Among others: Kirchgassner and Pommerehne (1996), Brülhart and Jametti (2006) and Brülhart et al. (2012)

⁵Indeed, for many public service categories all three levels of government are involved to varying degrees.

Thus, Switzerland presents an ideal setting to empirically test our hypothesis, with important autonomy at all levels of government in expenditure decisions well as in the institutional framework. All this in an otherwise fairly homogeneous setting.

5 Data and empirical model

5.1 Data

To test our hypothesis we assembled a database including annual observations of 119 of the largest municipalities belonging to 22 Swiss cantons over the period 1993 to 2007. Table 4 presents summary statistics of the data and Appendix Table A.1 gives the definition and source of each variable.

We use as dependent variable the net municipal expenditure per capita. This value is net of transfers that are received from other jurisdictions.⁶

We obtained information on cantonal direct democratic institutions from Fischer (2009). We consider whether the canton has a mandatory fiscal referendum for new spending projects or not. Some cantons changed their legislation in the period covered by our data, but this variation is very small. In 1995, 17 cantons over 26 had mandatory fiscal referendum. In 2007 the number of these cantons decreased to 16. In total 5 cantons changed at least once.⁷

The municipal institutional setting is taken from a new database at the local level by Bützer (2007).⁸ We again consider whether a municipality has a mandatory fiscal referendum for new spending projects or not. About 65% of the municipalities in our sample have a mandatory referendum of this kind.

This institution at municipal level is almost invariant over time for the period considered in Bützer (2007). The only change is in the municipality of Volkestwil in 2002 which adopted a fiscal mandatory referendum. The other changes that occurred concern the thresholds that trigger mandatory referendum. Importantly, there have been no changes at the municipal level following any of the changes in cantonal legislation. Although the number of municipalities considered is not large, our sample allows us to consider all possible institutional interactions, which is displayed in the last row of Table 1. During the period covered in our analysis 27% of the municipalities are without referendum in cantons without referendum, while 8% are municipalities without referendum in cantons with. Municipalities with referendum that belong

⁶See Buettner and Wildasin (2006) for details on how municipal fiscal budget is affected by intergovernmental transfers.

⁷Funk and Gathmann (2011) presents details of the variation for the period 1890-2000.

⁸Feld et al. (2011) use our same data source to revisit the analysis done by Feld and Kirchgässner (2001a). We extend Bützer's (2007) dataset by gathering information for a few additional municipalities.

to cantons without referendum are 29% of the total, while 36% of the municipalities with referendum are in cantons also with referendum.

We supplement the institutional information with an array of control variables covering socio-economic and political characteristics. Specifically, we control for *population* to consider possible economies of scale in the provision of public goods. We use population age shares for old and young (*share pop > 64* and *share pop < 20*), to consider possible differences in the demand of public goods. The *share of foreigners* is included for the same reason. Municipal *area* proxies higher costs in provision of public services as area is closely related to municipal topography. *Unemployment* controls both for the economic environment as well as the effect on social security. The presence of a *university* in a municipality should affect positively the level of expenditure either because of direct funding or because of related facilities. We also control for municipalities that are *urban centers*, to consider the possible higher demand for public goods for central places. Given that data on income are not available by municipality we use the amount of *federal tax on income* paid per capita. Again with this variable we control for the demand of public goods and use it as a proxy for tax revenues (see below).

Further, we control for political variables. The *number of ministers* and the *number of parties in the executive* should be positively related with our dependent variable because of the common pool problem (Roubini and Sachs, 1989). The share of *left-wing ministers in the executive* is usually used as proxy for citizens' preferences. Left-wing parties should be more in favor of government intervention implying a higher level of expenditure.

5.2 Empirical model

The model that we estimate is:

$$Y_{ict} = \beta_1 MunRef_i + \beta_2 CanRef_{ct} + \beta_3 MunRef_i * CanRef_{ct} + \beta_4 \mathbf{X}_{ict} + t_t + \epsilon_{ict} \quad (1)$$

where i denotes the municipality, c the canton and t the year. The dependent variable Y is the log of municipal expenditure per capita. \mathbf{X}_{ict} are other control variables including the political and cantonal ones, while t_t are year fixed effects. ϵ_{ict} is the error term.

5.2.1 Interaction model

To deal with a conditional hypothesis, as the one that we want to test, a proper empirical method to use is the multiplicative interaction model. By multiplying two terms we implicitly assume that the effect of a specific variable depends also on the value of the other variable. This is exactly what we want, discriminate the cantonal referendum effect on expenditure for

municipality with and without and referendum. Coefficients estimated do not have anymore the usual meaning and confidence intervals need to be computed to asses the significance of constitutive variables.⁹

We start by estimating the model in Equation (1) without considering institutional interaction, mainly for comparison to prior studies. We then proceed to add the interaction term to test our main hypothesis.

5.2.2 Error specification

We use as baseline standard errors clustered by cantons, since errors of municipalities within the same cantons might be correlated. As the number of clusters is less than 42 ,(Angrist and Pischke, 2009) these standard errors should be taken with some caution. Thus, for completeness we calculate also standard errors based on the wild bootstrap method (Miller et al., 2008). Further, given the panel structure of our dataset, serial correlation on the expenditure could arise. Thus, we make a robustness check by clustering the error at municipal level.

Finally, given that our observations are geographical units we control for spatial correlation among municipalities.

5.2.3 Cantonal heterogeneity

Funk and Gathmann (2011) find that cantonal unobserved heterogeneity affects in an important way the impact of direct democratic institutions on public expenditure. Using canton fixed effects they find that referendum at cantonal level reduces the level of expenditure at the same level, which is consistent with previous finding (Feld and Matsusaka, 2003), but does not effect at all expenditure at lower level nor on the level of decentralization, which is in contrast with previous findings (Feld et al., 2008; Matsusaka, 1995).

Ideally, our estimation of Equation 1 would also include canton fixed effects. However, as mentioned above the institutional variability at the cantonal level is very small. As such, the effect of a mandatory cantonal referendum would only be identified by those municipalities which belong to cantons with changes in the year of the change. In our case this would be only 43 observations over a sample of 1785. We thus report results using cantonal fixed effects as a further robustness check to our baseline results.

However, accounting for cantonal heterogeneity is important. Therefore we control, as an alternative to fixed effects, for observable cantonal differences. We include a dummy variable for Latin language cantons to control for cultural differences across regions. Further, we control for political preferences using the share of seats of left wings party in the cantonal parliament.

⁹Given that we consider a dependent variable which is in log form, the coefficient represents the percentage change in the dependent variable given by an increase of one unit in the value of the independent variable.

To take into account the demand side we include cantonal population and the dependence ratio. In addition, we use a dummy variable for the canton of Basel-City. This is due to its particular status of being both canton and municipality.¹⁰

Finally, we use random effects estimation. With random effects we assume that cantonal effects are not fixed but have a distribution, assuming that the error component is not correlated with the independent variables. Given the structure of the dataset we use an unbalanced nested error component model. Our dataset is the classical example of a hierarchical and unbalanced panel. It is hierarchical because municipalities are grouped by canton and unbalanced because in each cantons considered there is a different number of municipalities. In a situation like this one might consider the error term as composed by three elements. In panel analysis we assume $\epsilon_{it} = \mu_i + \nu_{it}$, instead, in a two way error component model, in which data present nested grouping, the error could be viewed as $\epsilon_{ict} = \mu_i + \nu_{ic} + u_{ict}$ where $\mu_i \sim (0, \sigma_\mu^2)$, $\nu_{ic} \sim (0, \sigma_\nu^2)$ and $u_{ict} \sim (0, \sigma_u^2)$. By computing the error in this way we can control for unobserved cantonal and municipal effects (Baltagi et al., 2001).

5.2.4 Income

Certainly income is an important determinant of the level of public expenditures. However, via the government budget constraint there is a direct link between income, essentially defining tax revenues, and public expenditures. Income and expenditure are, thus, jointly determined. This problem is aggravated for the case of Switzerland via the particularity that local authorities directly tax income.

To deal with this issue, as a robustness check, we instrument income. To do so we should use as instruments municipal features that are related with income but not with public expenditure. The instruments we use are the municipal area that is dedicated to recreational activity and the area dedicated to industrial activity. We might think that people with high income prefer to live in municipalities in which area dedicated to recreation is prominent rather than in places with a large area dedicated to productive activity.

6 Results

6.1 Main results

In Table 5 we show the results of our analysis which does not consider the interaction term. Direct democracy effect on expenditure seems to be coherent with some of the previous findings and in contrast with others.

¹⁰To be precise, besides Basel there are two other, much smaller, municipalities in the canton of Basel-City.

In contrast to the results of the cross-sectional analysis by Feld and Kirchgässner (2001b) we find that direct democratic institution at municipal level has no direct effect on expenditure. By looking at the first three columns of Table 5 we highlight that this is true when we control for socio-economic and also political variables. Extending previous analysis, we use pooled time series cross-section data and we also consider cantonal controls. This two improvements make our results more robust. On the one hand, thanks to time series cross-section structure we add more informative data positively affecting the efficiency of the estimation. On the other hand the cantonal controls go in the direction already developed by Funk and Gathmann (2011) to consider cantonal heterogeneity.

In the last three columns of Table 5 we show that cantonal referendum affects positively the municipal expenditure. This is coherent with the finding of Matsusaka (1995) but in contrast with Funk and Gathmann (2011). Municipalities that belong to cantons with mandatory referendum presents an expenditure level that is almost 18% higher than the ones belonging to cantons without referendum.

Almost all the control variables are coherent with our expectations. The ones that are always significant are the share of young population, the municipal area and the federal tax income. Young population negatively affect municipal expenditure, while municipal area and income have a positive effect.

In Table 6 we present our main results including the interaction term. As already remarked, coefficients in an interaction model do not have the usual meaning. Then, confidence interval to consider is not always the one calculated by the standard error in table. Thus, we show also tests for joint significance of the parameters of interest.

Municipal referendum has a positive sign but is not significant in any of the specifications. Cantonal referendum is always significant at the 1% level with a positive sign. These results are in line with the ones provided without considering the interaction term.

To confirm our hypothesis we should check the significance level of the interaction term. We see that is not significant in column (1), when neither socio-economical nor political controls are used. By adding the socio-economical controls the interaction term becomes significant at the 10% level as reported in column (2). With the complete specification including also political controls, column (3), the interaction term becomes significant at the 5% level.¹¹ The sign is always negative. Municipal referendum seems to reduce the positive effect on expenditure from cantonal referendum. More in detail, considering the last column of Table 6, if the municipality does not have a referendum this effect is stronger (0.299) than the case in which municipality have the referendum (0.299-0.174=0.046). The F-statistic to test for joint significance of the

¹¹Using wild-bootstrap method to correct for few clusters we find the following p-values: 0.819 for the municipal referendum, 0.007 for the cantonal referendum and 0.105 for the interaction term.

coefficients Mandatory ref. (can) and Mandatory ref. (can)*(mun) is significant at the 99% confidence level.

Our data thus confirms our hypothesis that cantonal referendum affects municipal policies depending on whether it also has a referendum or not. Following our intuition, it seems that if citizens control is at just one level of government, then the other level of government, if it is free to choose, spends more. These higher expenditures from a political economy point of view could represent rent seeking of politicians.¹² Then, to tame the leviathans in a federation it is not enough to tighten the control of citizens at just one level of government. The only way to reduce it, seems to be by extending direct democratic instrument to both levels of government.

6.2 Robustness checks

6.2.1 Error specification and cantonal heterogeneity

In Table 7 we show our main results after subjecting the baseline regression in column (3) of Table 6 to different robustness checks.

First, we deal with possible issues related with the error. In column (1) of Table 7 we cluster at municipal level. By doing so we deal with possible serial correlation given by the structure of our dataset. As in Table 6 municipal referendum is not significant while the cantonal is. Also the interaction term is still significant at the 5% level, again confirming our hypothesis.

In column (2) we take into account spatial correlation that could be present since the observations represent geographical units. We show results that consider as neighborhood all municipalities that are within a distance of 15 km. The interaction term now turns out to be significant at the 1% level.

Secondly, we deal with possible bias related with cantonal unobserved heterogeneity. In column (3) we use a random effect estimation with an unbalanced nested error component model. Again, only cantonal referendum and the interaction term are significant. The effect of cantonal referendum on local expenditure is now (0.109) if the municipality does not have a referendum, and $(0.109-0.103=0.006)$ in the case in which the municipality has the referendum. According to this set of results cantonal effect on local expenditure is erased by the presence of referendum also at the municipal level.

Finally, for completeness we report the results by using cantonal fixed effects. As already mentioned, fixed effects are in this case mainly biased because of the few institutional changes. The results are reported in column (4) of Table 7. The variables of interest still present the signs that we previously found. In this case the interaction term is not significant. Cantonal referendum is now significant at the 10% level.

¹²One might think also that upper level government, because of the constraint given by referendum, shift competences to lower level implying an increase in expenditure.

6.2.2 Instrumental variable

In Table 8 we report a further robustness check trying to solve the endogeneity problem given by the joint determination of income and public expenditure.

For completeness we report first stage regressions in Appendix Table A.2.

In column (1) we apply 2sls to our baseline estimation. The instruments pass the weak instrument tests and the Sargan statistic test for over-identification. Although not significant, municipal referendum has a negative impact on local expenditure while cantonal referendum has a positive effect and is significant. Interaction term is also significant at the 10% level and negatively related with local public expenditure.

We report in column (2) the results when we use fixed effects even though we are aware that the instruments do not work fine in this case.

To be able to use an IV strategy considering also spatial correlation we use the spatial GMM estimator as proposed by Conley (1999) and show the results in column (3). Our results are again confirmed. Municipal referendum has no effect on local expenditure while cantonal one has positive effect and it is also significant at the 1% level. The interaction term has significant negative sign.

Overall, all our robustness checks confirm the main results.

7 Conclusion

We revisit previous empirical findings on the relationship between public expenditure and decision making process. We deal specifically with different policy outcomes due to representative versus direct democratic legislation. We test for the effect of upper level referendum on public expenditure at lower level jurisdictions in a federal context.

Using the particular features of Swiss institutional setting we discriminate these results for lower level decision making process. We verify that municipalities spend more in cantons with referendum. Moreover, this expansive effect varies between municipalities with and without referendum. Municipalities with referendum find reduces this positive effect driven by the cantonal institution.

Vertical interaction of different decision making process seems to matter in the definition of public policies. Thus, to account for the real effect of direct democracy in a federal setting, one should consider all the tiers of government that are involved in policies definition. Having direct democratic institution at just one level of government it is not enough to tame the leviathan. What appear is that if just one of the two levels of government has no constraint it will spend more. The global impact of direct democracy on expenditure is actually lower than what suggested in previous research. The hypothesis of a good effect due to vertical yardstick

competition it is not confirmed in our analysis.

To really tame the leviathan all the levels of government involved in the public good provision should present some degree of direct democracy such that no vertical effect arise.

References

- Acemoglu, Daron, Simon Johnson, and James A. Robinson (2001) ‘The colonial origins of comparative development: An empirical investigation.’ *American Economic Review* 91(5), 1369–1401
- Aghion, Philippe, Alberto Alesina, and Francesco Trebbi (2004) ‘Endogenous political institutions.’ *The Quarterly Journal of Economics* 119(2), 565–611
- Angrist, Joshua David, and Jörn-Steffen Pischke (2009) *Mostly harmless econometrics* (Princeton, NJ [u.a.]: Princeton Univ. Press)
- Baltagi, Badi, Seuck Heun Song, and Byoung Cheol Jung (2001) ‘The unbalanced nested error component regression model.’ *Journal of Econometrics* 101(2), 357–381
- Besley, Timothy J., and Harvey S. Rosen (1998) ‘Vertical externalities in tax setting: evidence from gasoline and cigarettes.’ *Journal of Public Economics* 70(3), 383–398
- Brühlhart, Marius, Mario Jametti, and Kurt Schmidheiny (2012) ‘Do agglomeration economies reduce the sensitivity of firm location to tax differentials?’ *Economic Journal* 122(563), 1069–1093
- Brulhart, Marius, and Mario Jametti (2006) ‘Vertical versus horizontal tax externalities: An empirical test.’ *Journal of Public Economics* 90(10-11), 2027–2062
- Bützer, Gebhard (2007) *Direkte Demokratie in Schweizer Städten: Ursprung, Ausgestaltung und Gebrauch im Vergleich* (Baden-Baden: Nomos.)
- Buettner, Thiess, and David E. Wildasin (2006) ‘The dynamics of municipal fiscal adjustment.’ *Journal of Public Economics* 90(6-7), 1115–1132
- Conley, T. G. (1999) ‘Gmm estimation with cross sectional dependence.’ *Journal of Econometrics* 92(1), 1–45
- Downs, Anthony (1957) ‘An economic theory of political action in a democracy.’ *Journal of Political Economy* 65, 135
- Feld, Lars P., and Gebhard Kirchgässner (2000) ‘Direct democracy, political culture, and the outcome of economic policy: a report on the swiss experience.’ *European Journal of Political Economy* 16(2), 287–306
- (2001a) ‘Does direct democracy reduce public debt? evidence from swiss municipalities.’ *Public Choice* 109(3-4), 347–70

- (2001b) ‘The political economy of direct legislation: direct democracy and local decision-making.’ *Economic Policy* 16(33), 329–367
- Feld, Lars P., and John G. Matsusaka (2003) ‘Budget referendums and government spending: evidence from swiss cantons.’ *Journal of Public Economics* 87(12), 2703–2724
- Feld, Lars P., Christoph A. Schaltegger, and Jan Schnellenbach (2008) ‘On government centralization and fiscal referendums.’ *European Economic Review* 52(4), 611–645
- Feld, Lars P., Gebhard Kirchgässner, and Christoph Schaltegger (2011) ‘Municipal debt in switzerland: new empirical results.’ *Public Choice* 149(1), 49–64
- Fischer, Justina AV (2009) ‘Development of direct democracy in swiss cantons between 1997 and 2003.’ MPRA Paper, University Library of Munich, Germany, Jul
- Funk, Patricia, and Christina Gathmann (2011) ‘Does direct democracy reduce the size of government? new evidence from historical data, 1890–2000.’ *Economic Journal* 121(557), 1252–1280
- Gerber, Elisabeth R. (1996) ‘Legislative response to the threat of popular initiatives.’ *American Journal of Political Science* 40(1), pp. 99–128
- Kessler, Anke (2005) ‘Representative versus direct democracy: The role of informational asymmetries.’ *Public Choice* 122(1), 9–38
- Kirchgässner, Gebhard, and Werner W. Pommerehne (1996) ‘Tax harmonization and tax competition in the european union: Lessons from switzerland.’ *Journal of Public Economics* 60(3), 351–371
- Matsusaka, John G. (1992) ‘Economics of direct legislation.’ *The Quarterly Journal of Economics* 107(2), 541–71
- (1995) ‘Fiscal effects of the voter initiative: Evidence from the last 30 years.’ *Journal of Political Economy* 103(3), 587–623
- Micotti, Sébastien, and Gebhard Bützer (2003) ‘Municipal democracy in switzerland: General view, institutions and experiences in the cities 1990-2000.’ *Rapport de recherche au FNS/SNF*
- Miller, Douglas L., Jonah B. Gelbach, and A. Colin Cameron (2008) ‘Bootstrap-based improvements for inference with clustered errors.’ *The Review of Economics and Statistics* 90(3), 414–427

- Pommerehne, Werner W. (1978) 'Institutional approaches to public expenditure : Empirical evidence from swiss municipalities.' *Journal of Public Economics* 9(2), 255–280
- Redoano, Michela, and Kimberly A. Scharf (2004) 'The political economy of policy centralization: direct versus representative democracy.' *Journal of Public Economics* 88(3-4), 799–817
- Romer, Thomas, and Howard Rosenthal (1979) 'Bureaucrats versus voters: On the political economy of resource allocation by direct democracy.' *The Quarterly Journal of Economics* 93(4), 563–87
- Roubini, Nouriel, and Jeffrey D. Sachs (1989) 'Political and economic determinants of budget deficits in the industrial democracies.' *European Economic Review* 33(5), 903–933
- Schnellenbach, Jan, Lars Feld, and Christoph Schaltegger (2010) 'The impact of referendums on the centralisation of public goods provision: a political economy approach.' *Economics of Governance* 11(1), 3–26
- Tullock, Gordon (1980) *Towards A Theory of the Rent-Seeking Society* (Texas A & M University Press)
- Vatter, Adrian (2000) 'Consensus and direct democracy: Conceptual and empirical linkages.' *European Journal of Political Research* 38(2), 171–192

Table 1: Interactions possibilities

Jurisdiction	(a)		(b)	
	(1)	(2)	(3)	(4)
Cantonal	No Ref.	No Ref.	Ref.	Ref.
Municipal	No Ref.	Ref.	No Ref.	Ref.
Variability	27%	29%	8%	36%

Table 2: Destination of public expenditure by level of government in percentage, 2009

	State	Cantons	Municipalities	Total
Administration	57%	23%	20%	100%
Defense	91%	4%	5%	100%
Security	10%	64%	26%	100%
Economy	41%	38%	21%	100%
Environment	17%	22%	61%	100%
Social housing	1%	17%	82%	100%
Health	3%	84%	13%	100%
Culture and recreation	8%	32%	60%	100%
Education	9%	60%	31%	100%
Welfare	42%	38%	20%	100%

Source: Swiss Federal Department of Finance

Table 3: Use of direct democracy institutions, 1990-2010

	State	Cantons	Municipalities*
Initiative	76	354	187
Optional referendum	67	362	337
Mandatory referendum	45	1374	2918

Source: C2D, *Micotti and Bützer (2003)

Table 4: Summary statistics

Variable	Mean	Std. Dev.	Min.	Max.	N
Municipal expenditure p/c (Log)	12.78	0.34	11.49	14.66	1782
Mandatory ref. (mun)	0.64	0.47	0	1	1785
Mandatory ref. (can)	0.44	0.49	0	1	1785
Mandatory ref. (mun)*(can)	0.36	0.48	0	1	1785
Population (Log) (mun)	9.77	0.67	8.51	12.79	1785
Share pop foreigner (mun)	0.25	0.08	0.07	0.51	1785
Share pop < 20 (mun)	0.21	0.02	0.15	0.28	1785
Share pop > 64 (mun)	0.16	0.03	0.07	0.24	1785
Area (mun)	0.20	0.27	0.02	2.54	1785
Unemployment (mun)	4.12	2.02	0.2	12.3	1782
University (mun)	0.07	0.26	0	1	1785
Urban center dummy (mun)	0.42	0.49	0	1	1785
Federal tax on income p/c (mun) (Log)	2.13	0.50	0.57	4.70	1785
Left wings parties - cabinet (mun)	0.26	0.17	0	0.8	1782
Ministers (mun)	7.31	3.43	3	30	1782
Parties in Gov (mun)	3.95	0.95	2	8	1782
Cantonal Language (can)	0.28	0.45	0	1	1785
Left wings parties - cabinet (can)	0.27	0.12	0	0.6	1785
Dependency ratio (can)	59.25	16.38	-170.20	73.34	1785
Population (Log) (can)	12.97	0.82	10.54	14.08	1785
Recreational area (mun)	51.28	80.30	5	733	1785
Industrial area (mun)	51.30	46.32	0	259	1785

Table 5: Model without interaction term for the period 1993-2007

	(1)	(2)	(3)	(4)	(5)	(6)
Mandatory ref. (mun)	-0.002 (0.080)	0.008 (0.051)	0.002 (0.046)			
Mandatory ref. (can)				0.151** (0.062)	0.186*** (0.051)	0.179*** (0.049)
Population (Log) (mun)		-0.028 (0.044)	0.002 (0.037)		-0.014 (0.039)	0.004 (0.034)
Share pop foreigner (mun)		0.350 (0.387)	0.399 (0.348)		0.043 (0.332)	0.078 (0.297)
Share pop < 20 (mun)		-3.445* (1.959)	-3.747* (1.891)		-4.295** (1.740)	-4.499** (1.664)
Share pop > 64 (mun)		0.484 (1.106)	0.526 (1.145)		0.055 (1.229)	0.052 (1.227)
Area (mun)		0.164** (0.065)	0.140** (0.054)		0.141** (0.055)	0.127** (0.047)
Unemployment (mun)		0.012 (0.014)	0.008 (0.015)		0.026* (0.013)	0.023* (0.013)
University (mun)		0.285*** (0.083)	0.274*** (0.076)		0.215** (0.083)	0.213** (0.079)
Urban center dummy (mun)		0.086 (0.057)	0.081 (0.050)		0.087* (0.048)	0.083* (0.043)
Federal tax on income p/c (Log) (mun)		0.213** (0.089)	0.192** (0.081)		0.218** (0.083)	0.204** (0.075)
Left wings parties - cabinet (mun)			-0.203* (0.116)			-0.126 (0.109)
Parties in Gov (mun)			-0.021 (0.025)			-0.021 (0.023)
Ministers (mun)			0.008 (0.006)			0.005 (0.006)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Cantonal controls	Yes	Yes	Yes	Yes	Yes	Yes
Basel dummy	Yes	Yes	Yes	Yes	Yes	Yes
R ²	0.141	0.493	0.504	0.180	0.547	0.552
N	1782	1782	1780	1782	1782	1780

The dependent variable is the log annual municipal per capita expenditure.

Standard errors in parenthesis. Standard errors are clustered at the cantonal level. *p < 0.1, **p < 0.05 and ***p < 0.01.

Table 6: Model with interaction term for the period 1993-2007

	(1)	(2)	(3)
Mandatory ref. (mun)	0.025 (0.078)	0.004 (0.053)	0.014 (0.054)
Mandatory ref. (can)	0.279** (0.108)	0.292*** (0.073)	0.299*** (0.070)
Mandatory ref. (can)*(mun)	-0.183 (0.129)	-0.148* (0.079)	-0.174** (0.077)
Population (Log) (mun)		-0.009 (0.036)	0.017 (0.032)
Share pop foreigner (mun)		0.074 (0.318)	0.133 (0.278)
Share pop < 20 (mun)		-3.934** (1.567)	-4.104** (1.508)
Share pop > 64 (mun)		0.255 (1.171)	0.350 (1.171)
Area (mun)		0.151*** (0.052)	0.133*** (0.044)
Unemployment (mun)		0.031** (0.013)	0.028** (0.013)
University (mun)		0.198** (0.088)	0.190** (0.084)
Urban center dummy (mun)		0.094* (0.049)	0.090** (0.043)
Federal tax on income p/c (Log) (mun)		0.226** (0.081)	0.208*** (0.073)
Left wings parties - cabinet (mun)			-0.182 (0.107)
Parties in Gov (mun)			-0.019 (0.023)
Ministers (mun)			0.005 (0.006)
Year FE	Yes	Yes	Yes
Cantonal controls	Yes	Yes	Yes
Basel dummy	Yes	Yes	Yes
Significance inter + (can) ¹	*	***	***
Significance inter + (mun) ²	-	-	**
R ²	0.193	0.555	0.563
N	1782	1782	1780

The dependent variable is the log annual municipal per capita expenditure.

Standard errors in parenthesis. Standard errors are clustered at the cantonal level. *p < 0.1, **p < 0.05 and ***p < 0.01.

¹ joint significance level of cantonal referendum and interaction

² joint significance level of municipal referendum and interaction

Table 7: Robustness checks

	OLS	Spatial OLS	Random Effect	Fixed Effect
	(1)	(2)	(3)	(4)
Mandatory ref. (mun)	0.014 (0.059)	0.014 (0.046)	-0.008 (0.050)	-0.043 (0.050)
Mandatory ref. (can)	0.299*** (0.052)	0.299*** (0.061)	0.109*** (0.035)	0.080* (0.040)
Mandatory ref. (can)*(mun)	-0.174** (0.067)	-0.174*** (0.070)	-0.103** (0.042)	-0.066 (0.046)
Year FE	Yes	Yes	Yes	Yes
Demo-Eco controls	Yes	Yes	Yes	Yes
Political controls	Yes	Yes	Yes	Yes
Cantonal controls	Yes	Yes	Yes	No
Basel dummy	Yes	Yes	Yes	No
Cantonal FE	No	No	No	Yes
R ²	0.563	0.563	0.444	0.699
N	1780	1780	1780	1780

The dependent variable is the log annual municipal per capita expenditure.

Standard errors in parenthesis. In column (1) standard errors are clustered at the municipal level. In column (2) spatial correlated standard errors. Neighborhood distance cutoff of 15 km. In columns (3-4) standard errors are clustered at the cantonal level. *p < 0.1, **p < 0.05 and ***p < 0.01.

Table 8: IV Robustness checks

	OLS	Fixed Effect	Spatial GMM
Mandatory ref. (mun)	-0.040 (0.052)	0.013 (0.086)	0.045 (0.080)
Mandatory ref. (can)	0.254*** (0.061)	0.121** (0.053)	0.287*** (0.086)
Mandatory ref. (can)*(mun)	-0.126* (0.067)	-0.199* (0.104)	-0.172* (0.106)
Demo-Eco controls	Yes	Yes	Yes
Political controls	Yes	Yes	Yes
Cantonal controls	Yes	No	Yes
Basel dummy	Yes	No	Yes
Cantonal FE	No	Yes	No
<i>Weak instruments test</i>			
Shea's Partial R ²	0.108	0.038	0.108
F-statistic	19.11	6.39	13.31
<i>Overidentification test</i>			
Sargan statistic	2.4678	9.472	2.067
p-value	0.116	0.002	0.350
R ²	0.453	0.699	0.463
N	1780	1780	1780

The dependent variable is the log annual municipal per capita expenditure.

Federal tax on income p/c is instrumented using all regressors, plus industrial municipal area and recreational municipal area as instruments.

Standard errors in parenthesis. In columns (1-2) standard errors are clustered at the cantonal level. In column (3) spatial correlated standard errors. Neighborhood distance cutoff of 15 km. *p < 0.1, **p < 0.05 and ***p < 0.01.

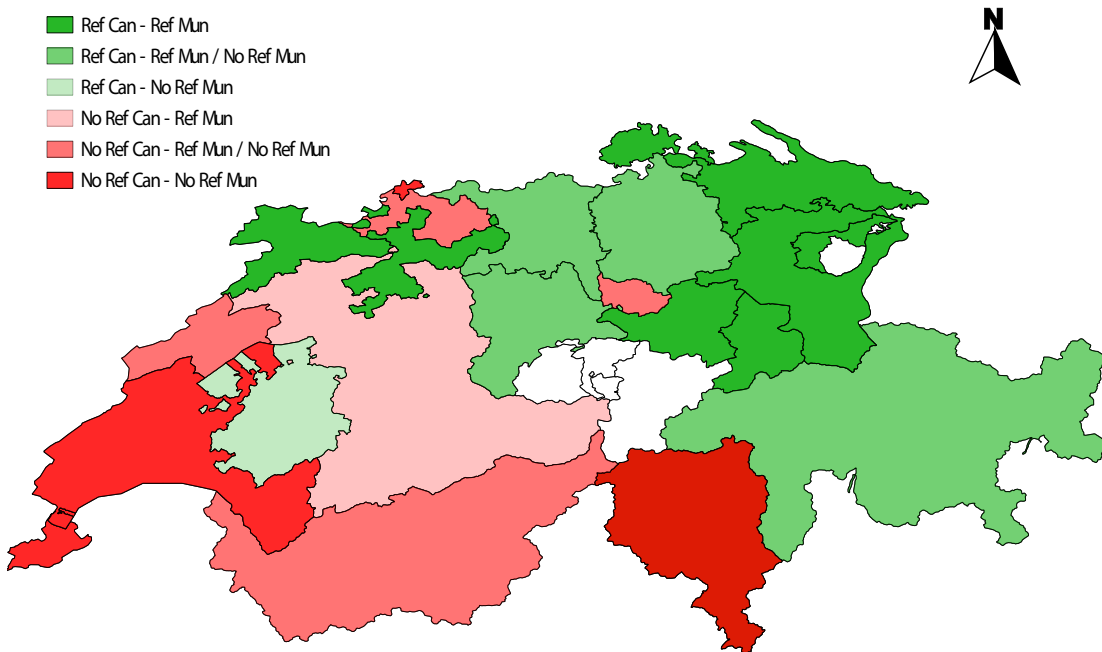


Figure 1: Variability of direct democratic institutions in Switzerland.

A APPENDIX

Table A.1: Data description

Variable Name	Description	Source
Municipal expenditure p/c (Log)	Natural logarithm of expenditure net per capita	Own calculation on the basis of data from Statistiques des Ville Suisses
Mandatory ref. (mun)	Dummy variable = 1, in case mandatory referendum exist, and zero otherwise (municipal)	Bützer (2007)
Mandatory ref. (can)	Dummy variable = 1, in case mandatory expenditure referendum exist, and zero otherwise (cantonal)	Fischer (2009)
Mandatory ref. (mun)*(can)	Mandatory ref. (mun)*Mandatory ref. (can)	Own calculation
Population (Log) (mun)	Natural logarithm of municipality population	Own calculation on the basis of data from Swiss Federal Statistical Office
Unemployment (mun)	Share of unemployment people	Statistiques des Ville Suisses
Share pop foreigner (mun)	Share of foreigner on municipal population in 2000	Statistiques des Ville Suisses
Share pop < 20 (mun)	Share of people with age < 20 on municipal population in 2000	Statistiques des Ville Suisses
Share pop > 64 (mun)	Share of people with age > 64 on municipal population in 2000	Statistiques des Ville Suisses
Area (mun)	Municipal surface	Swiss Federal Statistical Office
University (mun)	Dummy variable = 1, in case municipality with university, and zero otherwise	Own calculation
Urban center dummy (mun)	Dummy variable = 1, in case municipality is a urban center, and zero otherwise	Own calculation
Federal tax on income p/c (Log) (mun)	Average municipal federal tax paid on income. Linear interpolation is used for missing years.	Statistiques des Ville Suisses
Parties in Gov (mun)	Number of parties in cabinet (municipal)	Own calculation on the basis of data from Statistiques des Ville Suisses
Left wings parties - cabinet (mun)	Share of seat in the cabinet own by a left party (Socialist, Green and other local left parties)	Own calculation on the basis of data from Statistiques des Ville Suisses
Ministers (mun)	Number of minister in cabinet (municipal)	Own calculation on the basis of data from Statistiques des Ville Suisses
Population (Log) (mun)	Natural logarithm of municipality population	Own calculation on the basis of data from Swiss Federal Statistical Office
Left wings parties - cabinet (can)	Share of seat in the cabinet own by a left party (Socialist, Green and other left parties)	Own calculation on the basis of data from Swiss Federal Statistical Office
Dependency ratio (can)	(Number of people aged 0-19 and those aged 65 and over) / (Number of people aged 20-64)	Own calculation on the basis of data from Swiss Federal Statistical Office
Cantonal language (can)	Dummy variable = 1, in case the municipality belong to a non-German speaking canton	Own calculation
Recreational area (mun)	Municipal area devoted to recreational activities	Data from Swiss Federal Statistical Office
Industrial area (mun)	Municipal area devoted to industrial activities	Data from Swiss Federal Statistical Office

Table A.2: First stage regressions

	OLS	Fixed Effect	Spatial GMM
Recreational area (mun)	0.012*** (0.003)	0.003 (0.004)	0.012*** (0.004)
Industrial area (mun)	-0.045*** (0.007)	-0.025*** (0.007)	-0.045*** (0.009)
Demo-Eco controls	Yes	Yes	Yes
Political controls	Yes	Yes	Yes
Cantonal controls	Yes	No	Yes
Basel dummy	Yes	No	Yes
Cantonal FE	No	Yes	No
R ²	0.467	0.643	0.467
N	1780	1780	1780

The dependent variable is the log of federal tax on income p/c.
Standard errors in parenthesis. In columns (1-2) standard errors are clustered at the cantonal level. In column (3) spatial correlated standard errors. Neighborhood distance cutoff of 15 km. *p < 0.1, **p < 0.05 and ***p < 0.01.