

Hodler, Roland; Luechinger, Simon; Stutzer, Alois

Working Paper

The Effects of Voting Costs on the Democratic Process and Public Finances

WWZ Discussion Paper, No. 2012/02

Provided in Cooperation with:

Center of Business and Economics (WWZ), University of Basel

Suggested Citation: Hodler, Roland; Luechinger, Simon; Stutzer, Alois (2012) : The Effects of Voting Costs on the Democratic Process and Public Finances, WWZ Discussion Paper, No. 2012/02, University of Basel, Center of Business and Economics (WWZ), Basel

This Version is available at:

<http://hdl.handle.net/10419/123432>

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February 2012

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Roland Hodler, Simon Luechinger, Alois Stutzer

The Author(s):

Prof. Dr. Roland Hodler

University of Lucerne
Department of Economics
Frohburgstrasse 3
CH-6002 Lucerne
Switzerland
roland.hodler@unilu.ch

Prof. Dr. Simon Luechinger

University of Lucerne
Department of Economics
Frohburgstrasse 3
CH-6002 Lucerne
Switzerland
simon.luechinger@unilu.ch

Prof. Dr. Alois Stutzer

University of Basel
Faculty of Business and Economics
Peter Merian-Weg 6
CH - 4002 Basel
alois.stutzer@unibas.ch

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Contact:

WWZ Forum | Peter Merian-Weg 6 | CH-4002 Basel | forum-wwz@unibas.ch | wwz.unibas.ch

The Effects of Voting Costs on the Democratic Process and Public Finances

Roland Hodler* Simon Luechinger[†] Alois Stutzer^{‡§}

January 27, 2012

Abstract

Increasing the attractiveness of voting is often seen as a remedy for unequal participation and the influence of special-interest groups on public policy. However, lower voting costs may also bring less informed citizens to the poll inviting efforts to sway these voters. We substantiate this argument in a probabilistic voting model with campaign contributions. In an empirical analysis for the 26 Swiss states, we find that lower voting costs due to postal voting are related to higher turnout, lower average education of participants, lower knowledge on the political issues they were deciding on as well as lower government welfare expenditures.

JEL classification: D72, D78, H00

Keywords: Fiscal policies, political knowledge, postal voting, special-interest politics, voter turnout, voting costs

*University of Lucerne, Department of Economics, Frohburgstrasse 3, 6002 Lucerne, Switzerland, Email: roland.hodler@unilu.ch.

[†]University of Lucerne, Department of Economics, Frohburgstrasse 3, 6002 Lucerne, Switzerland, Email: simon.luechinger@unilu.ch.

[‡]University of Basel, Faculty of Business and Economics, Peter Merian-Weg 6, 4002 Basel, Switzerland, Email: alois.stutzer@unibas.ch.

[§]We thank Sven Feldmann and Andrea Prat for helpful comments, and Stefan Gärtner and Sibylle Haas for excellent research assistance. This working paper supersedes the working paper “Compulsory Voting and Public Finance”.

1 Introduction

Democratic decision-making in elections and referenda is characterized by unequal turnout as rich and well educated citizens are more likely to participate than their less privileged compatriots.¹ Many students of democracy worry that this unequal participation translates into fiscal policies that are biased towards privileged citizens (see, e.g., Lijphart 1997). Various institutional mechanisms have been proposed to achieve a more equal representation. In these proposals, voting costs figure prominently. Incentives for participation are expected to be higher with postal voting or some form of electronic voting involving lower costs for citizens, or with institutional mechanisms like compulsory voting that increase the costs of abstention.

However, voting costs might also work as a selection device bringing the confident citizens to the poll but not the halfhearted ones. Lower voting costs may thus induce more people to vote who only have a diffuse understanding of what their preferred alternative is. The latter circumstances though invite efforts to influence these voters. Special-interest groups might offer more campaign contributions allowing parties to try to sway these voters in exchange for rents or policies tilted towards these groups. Whether lower voting costs contribute to a better serving of citizens' preferences is thus far from clear.

In this paper, we scrutinize the argument that lowering voting costs might have unintended effects on political outcomes. We first analyze theoretically how voting costs affect the political process and, thereby, public finances. We base this analysis on a probabilistic voting model with campaign contributions similar to the models of Baron (1994), Grossman and Helpman (1996, 2001), and Persson and Tabellini (2000). In this model, political candidates choose their policy platform, which consists of public goods provision and rent payments to lobby groups. The latter can make campaign contributions to political candi-

¹Tingsten (1937, p. 155) was one of the first to provide systematic evidence that “the voting frequency rises with rising social standard.” Lijphart (1997) reviews many studies that document unequal turnout.

dates. Informed voters base their decision primarily on policy platforms, while uninformed or impressionable citizens base their decision primarily on political advertisements paid for by campaign contributions. Unlike in existing voting models with campaign contributions, in our model citizens decide how much political information to acquire, and whether or not to participate in the election. We assume that the costs of acquiring political information are lower for citizens with good education/high incomes. Further, citizens have to bear costs when voting, and we follow Matsusaka (1995) in assuming that the citizens' benefit from voting are the higher, the more confident they are of their vote choice.²

In this model citizens with good education/high incomes are more likely to take informed decisions when voting, and they are also more likely to participate in the election. The composition of participants changes if technological innovations in the electoral process like postal voting decrease voting costs. Such innovations increase electoral participation as well as the share of less educated and thus impressionable voters whose vote choice depends on campaign contributions rather than policy platforms. As a consequence, candidates propose platforms with higher tax rates and total government spending to increase rent payments to lobby groups (as compensation for higher campaign contributions).³ The effect of lower voting costs on public good provision or, more generally, on expenditures not targeted at special-interest groups is ambiguous in general, and negative with Cobb-Douglas preferences. These changes in fiscal policies harm citizens with high incomes, and possibly also less privileged citizens. Therefore, in contrast to what conventional wisdom suggests, our model shows that lower voting costs benefit special-interest groups, but may well harm all other citizens in society.

In our model, regulations that increase the costs of abstention, such as compulsory voting, have the same effect on fiscal policies as lower voting costs. Hence they also lead to

²Lassen (2005) offers evidence from a natural experiment that better-informed people vote more.

³This result is consistent with the finding of Wegenast (2010) that interest groups are less influential in US states with highly educated and well informed citizens.

higher rents and higher taxes, with the effect on public goods provision being ambiguous. In addition, compulsory voting directly hurts all citizens who did not vote before the increase in abstention costs.

We empirically test the predictions of the model for a procedural innovation that significantly reduces voting costs: postal voting. We thereby exploit the natural experiment provided by the staggered introduction of postal voting in the 26 Swiss states. This allows us to identify the effects of reduced voting costs and to separate it from time-, issue- and state-specific effects on political outcomes. Switzerland provides an ideal testing ground for two additional reasons. First, frequent direct democratic decisions at the national level allow us to observe participation decisions and changes in characteristics of participants at a higher temporal resolution than what is normally possible. Second, Swiss states have a high degree of fiscal autonomy which makes it possible to study effects on public finances.

The empirical analysis refers to the years 1981 to 2005. First, we establish the impact of postal voting on participation. We find evidence for a 4 percentage point increase in voter turnout with postal voting. Second, based on a series of post-ballot surveys, we analyze how postal voting affects the average level of education and household income of participants as well as the participants' knowledge on ballot propositions (i.e., popular initiatives and referenda). We find that postal voting is related to a systematic change in the composition of the voting population. On average, voters have fewer years of education and know less on the propositions they voted on. Finally, we study the correlation of postal voting with total government and welfare expenditures. We find no systematic correlation of the introduction of postal voting with total government expenditures. However, welfare expenditures are lower. While the latter result might come as a surprise, it is consistent with our model allowing for less government expenditures that are not targeted at special-interest groups in response to lower voting costs.

This paper contributes to four different strands of the theoretical and empirical political

economy literature. First, it builds on the contributions of Baron (1994), Grossman and Helpman (1996, 2001), and Persson and Tabellini (2000) on the role of campaign contributions in elections. Due to its focus on fiscal policies, our model is probably closest to Persson and Tabellini (2000). The main differences to all these contributions are that we deviate from the assumption of full (or random) voting participation, and that we do not take the share of informed voters as exogenous. This allows us to show that lower voting costs make campaign contributions more important and, consequently, special-interest groups more powerful.⁴

Second, Meltzer and Richard (1981) contributed one of the most prominent models in political economics linking the composition of the voting population with public finances. Restricting government activities to redistribution financed by a proportional income tax, their model predicts that a stronger representation of lower income citizens in the political process leads to more redistribution. Empirical evidence for this prediction (often exploiting different extensions of franchise) is rather mixed (see, e.g., Husted and Kenny 1997, Rodriguez 1999, Alesina and Glaeser 2004, Gradstein and Milanovic 2004, Stutzer and Kienast 2005). Our model offers a novel explanation for the lack of strong and unambiguous empirical support for the Meltzer-Richard hypothesis: the inclusion of poorer and less educated citizens may have increased the clout of special-interest groups to the detriment of policies benefiting the general population, including the newly enfranchised citizens.

Third, voting costs are a key ingredient in the rational choice model of voting participation (Downs 1957, Riker and Ordeshook 1968, and for a review Aldrich 1997). Our evidence from difference-in-differences estimations contributes to a better understanding

⁴Strömberg (2004) endogenizes the share of informed voters in a probabilistic voting model with profit-maximizing media. Other recent contributions building on the aforementioned models provide a micro-foundation for the effect of political advertisement on voting decisions of imperfectly informed voters. In Prat (2002a, 2002b) political ads are non-informative, but the amount spent on political ads serves as a signal of the candidates' quality. In Coate (2004a, 2004b) political ads are directly informative and the probability that the voters understand the information increases in the amount spent on political ads. As we focus on the effects of voting costs on fiscal policies rather than on why and how political ads work, we leave these interesting aspects of political advertisement out.

of the quantitative importance of transaction costs related to voting and offers complementary evidence on the consequences of postal voting on turnout (see also Luechinger et al. 2007, Funk 2010, and for reviews, Qvortrup 2005 and Gronke et al. 2008).⁵ However, our analysis goes beyond this literature by documenting effects on the composition of participants and public finances. There are thus implications for postal voting and potentially also for Internet voting.⁶

Fourth, our paper contributes to the literature on the advantages and disadvantages of compulsory voting. So far, there have been surprisingly few theoretical contributions to this literature. Crain and Leonard (1993) consider the effect of compulsory voting on government spending in two separate political economy models. In line with conventional wisdom they hypothesize that compulsory voting would lead to higher public goods provision in a median voting model in which public goods provision is the only type of public spending, and to less rents to special-interest groups in pressure groups theories of government. We improve upon Crain and Leonard (1993) by studying the effects of lower voting (or higher abstention) costs on public goods provision and rents in a formal and unified model. Börgers (2004), and Krasa and Polborn (2009) compare welfare under compulsory and voluntary voting in costly voting models in which voters only benefit from voting if they are pivotal. These models focus on the voters' participation decision and their choice between two fixed alternatives, thereby abstracting from the way candidates choose their policy platforms and the role of special-interest groups, which are both at the heart of our paper. In a recent contribution, Krishna and Morgan (2011) argue that compulsory voting has the drawback that preference intensities can no longer affect voting participation

⁵Recent alternative approaches to assess the quantitative importance of transaction costs in voting participation are proposed in Brady and McNulty (2011) and Gibson et al. (2011). Besides transaction costs there are, of course, also the opportunity costs of voting. A careful empirical analysis on the relationship between employment, wages and voter turnout is provided by Charles and Stephens (2011).

⁶Internet voting trials have been conducted in various countries, including France, the Netherlands, Switzerland, the United Kingdom, and the United States. In Estonia all voters could use Internet voting in the national election in 2007 (Alvarez et al. 2009).

and, thereby, voting outcomes. This argument is loosely related to our general point that postal and compulsory voting may reduce the political knowledge of the average voter and, therefore, lead to inferior policy outcomes for the population at large.

In the following Section, we develop our voting model. Section 3 presents the data and the results of our empirical analysis. Section 4 offers concluding remarks.

2 The Model

2.1 Setting

There are two candidates, a lobby group, and a measure-one continuum of citizens. Each candidate $P \in \{A, B\}$ is office-motivated and chooses his policy platform to maximize his winning probability p_P , where $p_A + p_B = 1$. Platforms consist of public goods provision $g_P \geq 0$ and rent payments to the lobby group $r_P \geq 0$. These two components of government spending are financed with a linear income tax, and the government budget must be balanced. Hence g_P and r_P determine the tax rate $\tau_P = \frac{g_P + r_P}{y}$, where y denotes average income. Candidates may differ in their policy platforms (g_P, r_P) as well as in some predetermined, i.e., exogenous, positions.

The lobby group can make campaign contributions $C_A \geq 0$ and $C_B \geq 0$ to candidates A and B at increasing marginal costs, and it receives rents r_P from the elected candidate P . Its utility is $\Pi(r_P, C_A, C_B) = J(r_P) - \frac{(C_A + C_B)^2}{2}$, where $J'(r_P) > 0$ and $J''(r_P) < 0$.

Citizens differ in their skills α^i , which may represent educational attainments or innate abilities. The distribution of α^i is given by $F(\alpha^i)$, with continuous density $f(\alpha^i)$ and mean α . For simplicity we assume $F(0) = 0$, $F(1) = 1$, and $f(\alpha^i) > 0$ for all $\alpha_i \in [0, 1]$. Skills α^i have two effects: First they determine citizen i 's income $y^i = \alpha^i$. Second they determine how costly it is for citizen i to acquire political knowledge $q_i \in [0, 1]$. We assume that a citizen's political knowledge q_i measures the probability that she is informed

rather than impressionable, thus understanding the candidates' platforms (g_P, r_P) and their predetermined positions.

If candidate P is elected, the utility of citizen i is

$$W_{i,P} = W(g_P, r_P, \alpha^i, \sigma_P^i, p_i) = U(c_P^i) + H(g_P) + \sigma_P^i + I_i(\beta q_i - \gamma) - \frac{q_i^2}{2\alpha^i}. \quad (1)$$

The first two terms on the right-hand side reflect citizen i 's utility from private consumption $c_P^i = (1 - \tau_P)\alpha^i$ and public goods provision g_P , respectively. We assume $U'(c_P^i) > 0$, $U''(c_P^i) \leq 0$, $R_R(c_P^i) \equiv -\frac{c_P^i U''(c_P^i)}{U'(c_P^i)} < 1$, $H'(g_P) > 0$, and $H''(g_P) < 0$. The third term, σ_P^i , represents her utility from the predetermined positions of the elected candidate P . We further assume that $\sigma^i = \sigma_B^i - \sigma_A^i$ is uniformly distributed in $[\frac{-1}{2\phi}, \frac{1}{2\phi}]$.

The fourth term captures benefits and costs associated with voting. I_i is a dummy variable whose value is 1 if citizen i participates in the election, and 0 if she abstains. Some benefits from voting may well depend on the voter's political knowledge, like the satisfaction of being confident to have voted in one's own interest (Matsusaka, 1995). These benefits are βq_i . For simplicity, we set $\beta = 1$. The costs of completing and casting one's ballot are denoted by γ . These voting costs are relatively high when ballots must be cast at a polling station, but they decrease if postal voting or even Internet voting is introduced. The last term captures the costs of acquiring political knowledge q_i , which are decreasing in skills α_i .

Timing is as follows: First, the candidates choose their policy platforms (g_P, r_P) . Second, the lobby group can make campaign contributions. Third, elections take place. The elected candidate then implements the announced platform.

It remains to describe the voters' decisions.⁷ Informed voters vote for candidate A if $W_{i,A} \geq W_{i,B}$, and for candidate B otherwise. The electoral decisions of impressionable

⁷We use the term "voters" to refer to citizens who participate in the election and for whom the participation constraint thus holds.

voters are driven by political advertisements and policy irrelevant candidate characteristics. The share of impressionable voters who vote for candidate A is $\frac{1}{2} + \psi(\Delta C - \eta)$, where $\Delta C \equiv C_A - C_B$.⁸ The remaining impressionable voters vote for candidate B . Note that $\psi > 0$ measures the effectiveness of advertisements and, therefore, campaign contributions; and η is a popularity shock that is uniformly distributed in $[\frac{-1}{2\lambda}, \frac{1}{2\lambda}]$.

The appropriate solution concept for this sequential game is subgame perfect Nash equilibrium.

2.2 Discussion

We now discuss some of the assumptions made. Utility function (1) implies that the citizens' utility from private consumption c_P^i and public goods provision g_P is additively separable. The model could be solved with more general utility functions, but assuming additive separability simplifies the analysis, and still allows for popular specifications such as the quasi-linear preferences used by Persson and Tabellini (2000). What we need and want, however, is for any given r_P a negative relationship between a citizen's skills α^i and the public goods provision g_P^i that maximizes her utility. In our setting this relationship is strictly negative if and only if $R_R(c_P^i) < 1$.⁹

Utility function (1) further implies that citizens derive a benefit from voting if they cast an informed vote. Political knowledge q_i benefits voters, for example, because they value the confidence of having voted in their own interest, as suggested by Matsusaka (1995).¹⁰ In our model higher skilled voters will optimally acquire more political knowledge because of

⁸Following Persson and Tabellini (2000) we could assume that impressionable voter i votes for A if and only if $\Delta C > \varepsilon^i + \eta$, with ε^i being uniformly distributed in $[\frac{-1}{2\psi}, \frac{1}{2\psi}]$.

⁹To see this, observe that the first-order condition $-U'(c_P^i) \frac{\partial c_P^i}{\partial \tau_P} \frac{\partial \tau_P}{\partial g_P} + H'(g_P) = 0$, where $\frac{\partial c_P^i}{\partial \tau_P} = -\alpha^i$ and $\frac{\partial \tau_P}{\partial g_P} = \frac{1}{\alpha}$, determines g_P^i for any given r_P . Using the implicit function theorem, it can be shown that $\frac{\partial g_P^i}{\partial \alpha^i} = -\frac{U'(c_P^i)[R_R(c_P^i)-1]}{\alpha H''(g_P)}$, which is strictly negative if and only if $R_R(c_P^i) < 1$.

¹⁰In general, citizens also benefit from political knowledge if they are pivotal with non-zero probability. However, in our model where there is a continuum of voters this probability is zero.

lower information acquisition costs, which is consistent with empirical evidence that voters with better education and higher incomes are better informed (e.g., Benz and Stutzer 2004, and Lind and Rohner 2011). Again, other mechanism ensuring that higher skilled citizens acquire more political knowledge would serve our purpose equally well. In Larcinese (2005), for example, the effect of political knowledge on expected (future) income increases in the citizens' skills and income. Similarly, our results do not depend on the perfect correlation between incomes and the costs of acquiring political knowledge. A positive correlation is however necessary.

Voting is probabilistic in our model, such that small changes in policy platforms (g_P, r_P) only lead to small changes in the candidates' winning probabilities p_P . Following Grossman and Helpman (1996, 2001) and Persson and Tabellini (2000), we model probabilistic voting by assuming that candidates differ in predetermined positions or some other exogenous characteristics, and voters in their evaluation σ^i of these positions, and that a popularity shock η affects all (impressionable) voters.¹¹ We further follow Persson and Tabellini (2000) in assuming that σ^i and η are uniformly distributed with mean zero to get simple and tractable functional forms of the candidates' winning probabilities.

Equation (1) includes only voting costs, but no abstention costs. Citizens may feel bad when violating social norms and not fulfilling what might be perceived as a civic duty. Moreover, in countries with compulsory voting laws abstention may lead to a fine or a request to explain the failure to vote (as in Australia). We refrain from including abstention costs because higher abstentions costs have exactly the same effects on participation decisions and policy outcomes as lower voting costs. The only difference are their effects on welfare: abstracting from changes in policies, higher abstention costs hurt all citizens who would have abstained without the increase in abstention costs while lower voting costs benefit all voting citizens.

¹¹Results are virtually the same when η affects the decision of all voters as when it only affects the decision of impressionable voters.

To capture lobbying in a simple way, we assume that there is only one lobby group, that this lobby group cannot vote (or has measure zero), and that citizens do not benefit from rents r_P . However, we could derive similar results in a setting in which a non-negligible share of the citizens belong to lobby groups, and in which all these citizens benefit from rents and can decide whether or not to participate in the election.

2.3 Equilibrium analysis

In this section, we first derive the decisions of the citizens and the lobby group, which yield the candidates' objective function. We then study how changes in voting costs affect the candidates' policy platforms in two simplified versions of our model – one with exogenous rents, and one with an exogenous tax rate. Finally, we look at the complete model introduced above, and we discuss how changes in voting costs affect the equilibrium policy platforms as well as the welfare of the citizens and the lobby group.

2.3.1 Decisions of citizens and lobby group

We start by looking at the citizens' decisions of how much political knowledge q_i to acquire, and whether or not to participate in the election. For citizens who abstain from voting acquiring political knowledge has no benefits. Hence they choose $q_i = 0$. Citizens who participate in the election choose q_i to maximize $q_i - \frac{q_i^2}{2\alpha^i}$. Hence they choose $q_i = \alpha^i$. Citizens therefore acquire political knowledge $q_i = \alpha^i$ and participate in the election if $\alpha^i - \gamma - \frac{(\alpha^i)^2}{2\alpha^i} = \frac{\alpha^i}{2} - \gamma \geq 0$, i.e., if $\alpha^i \geq 2\gamma$, while they acquire no political knowledge and abstain from voting otherwise.¹² The election participation threshold 2γ directly determines voter turnout $1 - F(2\gamma)$. For simplicity we focus on cases in which $\gamma \in (0, \frac{1}{2})$, such that marginal changes in voting costs γ have an effect on voter turnout and equilibrium policy platforms. It follows:

¹²As a tie-breaking rule, we assume that citizens who are indifferent participate in the election.

Proposition 1. *Voter turnout decreases in voting costs γ .*

The voters' average skills and their average political knowledge are both given by $\frac{1}{1-F(2\gamma)} \int_{2\gamma}^1 \alpha^i f(\alpha^i) d\alpha^i$. Therefore:

Proposition 2. *The voters' average skills and their average political knowledge increase in voting costs γ .*

We next derive the expected election outcome as a function of the candidates' platforms (g_A, r_A) and (g_B, r_B) , and the campaign contributions C_A and C_B . Informed voters vote for candidate A if $\Delta V(\alpha^i) \equiv U(c_A^i) - U(c_B^i) + H(g_A) - H(g_B) > \sigma^i$, and for B otherwise. Among informed voters with skills $\alpha^i \geq 2\gamma$, the share voting for A is therefore $\frac{1}{2} + \phi \Delta V(\alpha^i)$.¹³ By assumption, the share of impressionable voters voting for A is $\frac{1}{2} + \psi(\Delta C - \eta)$ for any $\alpha^i \geq 2\gamma$. As the share of voters with skills $\alpha_i \geq 2\gamma$ who is informed equals $q_i = \alpha^i$, the population share who votes for A thus adds up to $\pi_A = \int_{2\gamma}^1 [\frac{1}{2} + \alpha^i \phi \Delta V(\alpha^i) + (1 - \alpha^i) \psi(\Delta C - \eta)] f(\alpha^i) d\alpha^i$, and the population share who votes for B to $\pi_B = 1 - F(2\gamma) - \pi_A$. Candidate A therefore wins if and only if $\int_{2\gamma}^1 [\alpha^i \phi \Delta V(\alpha^i) + (1 - \alpha^i) \psi(\Delta C - \eta)] f(\alpha^i) d\alpha^i \geq 0$. Hence his winning probability is

$$p_A = \text{prob} \left\{ \eta \leq \frac{\phi \int_{2\gamma}^1 \alpha^i \Delta V(\alpha^i) f(\alpha^i) d\alpha^i}{\psi \int_{2\gamma}^1 (1 - \alpha^i) f(\alpha^i) d\alpha^i} + \Delta C \right\} = \frac{1}{2} + \frac{\lambda \phi \int_{2\gamma}^1 \alpha^i \Delta V(\alpha^i) f(\alpha^i) d\alpha^i}{\psi \int_{2\gamma}^1 (1 - \alpha^i) f(\alpha^i) d\alpha^i} + \lambda \Delta C. \quad (2)$$

We now turn to the lobby group's decision. The lobby group chooses campaign contributions C_A and C_B to maximize its expected utility $p_A J(r_A) + (1 - p_A) J(r_B) - \frac{1}{2}(C_A + C_B)^2$, thereby anticipating the effects of C_A and C_B on p_A . The lobby group supports no candidate if rents r_A and r_B coincide, and the candidate promising more generous rents otherwise. It is easy to see that the lobby group chooses $C_A = \max\{0, \lambda[J(r_A) - J(r_B)]\}$

¹³More generally, this share is $\min\{\max\{0, \frac{1}{2} + \phi \Delta V(\alpha^i)\}, 1\}$, but for simplicity we assume that it is always strictly between zero and one. We make similar (implicit) assumptions for all vote shares and winning probabilities below.

and $C_B = \max\{0, \lambda[J(r_B) - J(r_A)]\}$, such that $\Delta C = \lambda[J(r_A) - J(r_B)]$. Inserting this expression for ΔC into equation (2) leads to

$$p_A = \frac{1}{2} + \frac{\lambda\phi \int_{2\gamma}^1 \alpha^i \Delta V(\alpha^i) f(\alpha^i) d\alpha^i}{\psi \int_{2\gamma}^1 (1 - \alpha^i) f(\alpha^i) d\alpha^i} + \lambda^2 [J(r_A) - J(r_B)]. \quad (3)$$

Candidate A anticipates the behavior of the lobby group and the citizens, and chooses his fiscal policy platform (g_A, r_A) to maximize his winning probability p_A . Candidate B chooses (g_B, r_B) to maximize $p_B = 1 - p_A$. It follows from equation (3) and the definition of $\Delta V(\alpha^i)$ that each candidate's optimal platform is independent of his opponent's platform, and that each candidate's maximization problem can be written as

$$\max_{g_P, r_P} \int_{2\gamma}^1 [\alpha^i U(c_P^i) + \alpha^i H(g_P) + (1 - \alpha^i) \Omega J(r_P)] f(\alpha^i) d\alpha^i \quad (4)$$

subject to $g_P \geq 0$, $r_P \geq 0$ and $\tau_P = \frac{g_P + r_P}{\alpha} \leq 1$, where $\Omega \equiv \frac{\psi\lambda}{\phi}$ measures how sensitive the electoral support from impressionable voters is to changes in campaign contributions relative to how sensitive the electoral support from informed voters is to changes in policy platforms. We assume throughout that the solution to this problem is interior. As it is standard in this type of lobbying models, the two candidates' platforms therefore coincide in equilibrium, such that the lobby group makes no campaign contributions even though the candidates offer rents $r_P > 0$.

2.3.2 Policy platforms when rents are exogenous (or absent)

We now look at a simplified version of our model in which rents r_P are exogenous and equal to $\bar{r} \in [0, \alpha)$. This simplified version includes the special case in which there are no rents and no lobbying.¹⁴ Hence it may be close to the model that some of the proponents

¹⁴Results are identical when assuming $r_P = 0$ as when assuming $\Omega = 0$. In the later case each candidate would choose $r_P = 0$, as rents have no effect on his winning probability p_P .

of eased voting or compulsory voting have in mind, and it indeed helps to understand why these procedural changes could potentially benefit citizens with low incomes.

In this simplified version of the model the two endogenous fiscal policy variables, g_P and τ_P , are tied together by the government budget constraint. Hence candidates have effectively only one choice, which we take to be g_P , and the maximization problem (4) reduces to

$$\max_{g_P} \int_{2\gamma}^1 \alpha^i [U(c_P^i) + H(g_P)] f(\alpha^i) d\alpha^i \quad (5)$$

with $c_P^i = (1 - \tau_P)\alpha^i$ and $\tau_P = \frac{g_P + \bar{r}}{\alpha}$. It follows:¹⁵

Proposition 3. *Assume $r_P = \bar{r}$. Then public goods provision g_P and the tax rate τ_P decrease in voting costs γ .*

The intuition for these results is as follows. Lower voting costs γ increase voter turnout and lower the average voter's income as well as the average informed voter's income. Since voters with lower incomes prefer higher public goods provision g_P (because $R_R(c_P^i) < 1$), the candidates respond to the lower income of the average informed voter by increasing g_P . This is very similar to the mechanism modeled in Meltzer and Richard (1981). Interestingly, however, even if $\gamma = 0$, policy platforms would remain biased towards citizens with high incomes, with g_P and τ_P still being relatively low. The reason is that candidates only care about informed voters, and that the share of informed voters always remains higher among citizens with high incomes.

We now briefly turn to the effects of lower voting costs γ on the welfare of citizens: Lower voting costs have a direct positive effect on the welfare of all voting citizens. Further, by increasing g_P and τ_P , they have indirect welfare effects that make citizens with low incomes better off and citizens with high incomes worse off.

¹⁵Proofs of Propositions 3 to 7 are in the appendix.

2.3.3 Policy platforms when the tax rate is exogenous

We now look at a simplified version of our model in which the tax rate τ_P is exogenous and equal to $\bar{\tau} \in (0, 1]$. This simplified version may reflect the situation in countries in which governments are substantially less constrained in how they allocate public spending than in the amount they can spend. In addition, it nicely illustrates the main mechanism by which lower voting costs or higher costs of abstention can lead to policy changes that make all citizens worse off.

When τ_P is exogenous, the two endogenous fiscal policy variables, g_P and r_P , are again tied together by the government budget constraint. Hence the candidates face a simple trade-off between high public goods provision g_P and high rents r_P . From their perspective, public goods are useful to increase electoral support from informed voters, while rents are useful to increase campaign contributions and, thereby, the electoral support from impressionable voters. The maximization problem (4) reduces to

$$\max_{g_P} \int_{2\gamma}^1 [\alpha^i H(g_P) + (1 - \alpha^i) \Omega J(r_P)] f(\alpha^i) d\alpha^i \quad (6)$$

with $r_P = \tau\alpha - g_P$. It follows:

Proposition 4. *Assume $\tau_P = \bar{\tau}$. Then public goods provision g_P increases in voting costs γ , but decreases in Ω , while rents r_P decrease in γ , but increase in Ω .*

To understand these results note that for a given tax rate, all citizens have the same policy preferences: they want public goods provision g_P to be as high as possible. Hence incentivizing more citizens to go to the polls, e.g., by lowering voting costs γ , would have no effect on equilibrium policies if the new voters were equally well informed as those who participated anyway. However these new voters are less skilled and, therefore, acquire less political knowledge even when they participate in the election. As a consequence the average voter's political knowledge decreases. The candidates optimally respond by

increasing rents r_P and lowering public goods provision g_P , as rents serve to win votes from impressionable voters while public goods serve to win votes from informed voters. Not surprisingly, rents r_P also increase in Ω , which measures how sensitive the electoral support from impressionable voters is to changes in campaign contributions relative to how sensitive the electoral support from informed voters is to changes in policy platforms.

Hence, when the tax rate is exogenous, lower voting costs γ lead to policy changes that benefit the lobby group at the expense of *all* citizens. In addition, there is again the direct positive effect on the voters' welfare. Ironically, lower voting costs are therefore unambiguously harmful for the poor who still abstain from voting despite the decrease in voting costs, and they may even hurt all citizens including those encouraged to vote by the decrease in voting costs.

2.3.4 Equilibrium policy platform

In this section, we derive the equilibrium of the complete model introduced in section 2.1 in which public goods provision g_P , rents r_P and the tax rate $\tau_P = \frac{g_P + r_P}{\alpha}$ are all endogenous. We know that in this case the candidates' maximization problem is given by (4).

We discuss the effects of voting and/or abstention costs on the three fiscal policy variables in turn, starting with their effects on the tax rate τ_P , which is proportional to the size of government $g_P + r_P$:

Proposition 5. *The tax rate τ_P and the size of government $g_P + r_P$ decrease in the voting costs γ , but increase in Ω .*

There are two reasons why lower voting costs γ and the associated increase in the turnout lead to a higher tax rate τ_P . First, as seen in Section 2.3.2, for any given r_P , a decrease in γ and the associated decrease in the average informed voter's income make it optimal for the candidates to choose a higher tax rate τ_P . This puts some upward pressure

on τ_P . Second, a decrease in γ reduces the share of informed voters among the voting population, because less skilled voters acquire less political knowledge. A higher tax rate τ_P has the advantage that it allows to increase g_P or r_P and, thereby, to raise electoral support from informed or impressionable voters, respectively. But a higher τ_P has the disadvantage that it lowers private consumption c_P^i of all citizens. This, however, only reduces the electoral support from informed voters. Hence when the share of informed voters decreases, the candidates become less concerned about the disadvantage of high taxes, while the advantage of high taxes remains similarly attractive. This puts additional upwards pressure on τ_P . Furthermore, the candidates choose a higher tax rate τ_P when the support from impressionable voters becomes relatively more sensitive to campaign contributions, i.e., when Ω increases.

We now turn to the effects of voting costs on the rents r_P paid to the lobby group:

Proposition 6. *Rents r_P decrease in voting costs γ , but increase in Ω .*

Some previous results are helpful to understand Proposition 6. We know from Proposition 4 that a decrease in voting costs γ and the associated increase in the share of impressionable voters increases rents r_P relative to public goods provision g_P for any tax rate τ_P ; and from Proposition 5 that a decrease in γ increases τ_P . Hence lower voting costs γ lead to more generous rents r_P , because a higher share of impressionable voters tilts both the size and the composition of public spending to the lobby group's benefit. Proposition 6 further shows that rents r_P increase in Ω , i.e., when the support from impressionable voters becomes relatively more sensitive to campaign contributions.

We next discuss how voting costs γ affect public goods provisions g_P . There are two countervailing effects: First, candidates would like to choose higher g_P when γ decreases, because the average informed voter then earns a lower income and, therefore, prefers higher g_P for given r_P (as seen in Proposition 3). Second, candidates would like to choose lower g_P when γ decreases, because informed voters also care about low tax rates τ_P , with the

marginal utility of τ_P being negative and decreasing, and because the decrease in γ already puts upwards pressure on τ_P by increasing rents r_P (as seen in Proposition 6). Any of these two effects may dominate in general. However, for some specific utility function the net effect is unambiguous:

Proposition 7. *Public goods provision g_P decreases in Ω . The effect of voting costs γ on g_P is ambiguous in general, but it holds:*

(i) *Assume $U(c_P^i) = \chi c_P^i$ with $\chi > 0$. Then g_P decreases in γ .*

(ii) *Assume $R_R(c_P^i) = \theta$ with $\theta \rightarrow 1$ (or $\theta = 1$). Then g_P increases in γ .*

Assumption (i) in Proposition 7 leads to quasi-linear preferences over c_P^i and g_P as in Persson and Tabellini (2000). With these preferences, the marginal effect of an increase in τ_P on $U(c_P^i)$ becomes independent of the levels of c_P^i and τ_P . Hence the second of the countervailing effects discussed above disappears, and the candidates choose higher g_P when γ decreases.

Assumption (ii) in Proposition 7 ensures that the differences between the preferred public goods provision g_P^i of citizens with different incomes converge towards zero. In this case the first of the countervailing effects discussed above becomes negligible, and the candidates choose lower g_P when γ decreases. The same also holds true when $R_R(c_P^i) = 1$, as is the case with Cobb-Douglas preferences in log form over c_P^i and g_P .

Proposition 7 further shows that the candidates choose lower public goods provision g_P when Ω increases, i.e., when the electoral support from informed voter becomes relatively less sensitive to changes in policy platforms.

Finally, let us look at the welfare of citizens and the lobby group. The lobby group only cares about high rents r_P . As lower voting costs γ increase r_P , they make the lobby group better off. Lower voting costs γ also have a direct positive effect on the welfare of voters. The indirect effects however are less clear-cut: Citizens prefer high public goods

provision g_P and low tax rates τ_P , and the importance they assign to the former relative to the latter decreases in their income. Lowering γ always increases τ_P , while the effect on g_P is ambiguous. Hence, when lowering γ reduces g_P , then the associated policy changes make all citizens worse off. But when lowering γ increases g_P , then the welfare effects of the associated policy changes depend on the citizens' income. Citizens with low incomes are better off as they primarily care about high g_P , while citizens with high incomes are worse off as they primarily care about low τ_P .

3 Empirical Analysis

In the following, we put our theoretical model to an empirical test. In particular, we study how a reduction in voting costs due to the introduction of unrestricted optional postal voting affected the political process and fiscal outcomes in the 26 Swiss states. The high degree of fiscal autonomy of Swiss states makes it possible that changes in participation decisions can translate into changes in fiscal policies. For the identification of the effects of postal voting, we exploit the natural experiment provided by the staggered introduction of postal voting in the states. Frequent direct democratic decisions at the national level allow us to observe participation decisions and characteristics of the voting population more frequently than what is normally possible. The staggered introduction of postal voting and the frequent national ballots allow us to test Propositions 1 and 2 independently of time-, issue- and state-specific effects. To test Proposition 1, we estimate the effect of postal voting on turnout in national ballots. To test Proposition 2, we use post-vote surveys and isolate the effect of postal voting on participants' average years of education, participants' average household income and participants' average ballot-specific knowledge.

We do not test Propositions 3 and 4 as they prepare for Propositions 5 to 7. This latter set of propositions is difficult to test empirically because rents to special-interest

groups are inherently difficult to capture. We still explore Proposition 5 as formulated in our model and study the relationship between postal voting and total government expenditures at the state level. For a test of Proposition 6 and 7, we concentrate on government welfare expenditures as this category of government expenditures is least likely to include rents to special-interest groups.¹⁶ Using government welfare expenditures, we explore the possibility that lower voting costs can result in lower public goods provision, i.e., in lower public expenditures net of rents. Importantly, government welfare expenditure is also the expenditure category most likely to benefit poor people, the supposed beneficiaries of reduced voting costs and higher voting participation. Welfare expenditures are, therefore, well suited to differentiate between our model and alternative theories, such as the Meltzer-Richard model, which predict that higher turnout should be associated with policy changes supporting poorer citizens.

3.1 Data

Our dependent variables are voter turnout, participants' average years of education, participants' average household income, participants' average ballot-specific knowledge, as well as total expenditures and welfare expenditures as shares of state income. Data for these variables come from various sources. The data on voter turnout for states and ballot dates comes from the Federal Statistical Office (FSO). The FSO registers voter turnout for every ballot. As there are usually several propositions at a particular date, we calculate average turnout per state and ballot date. Voter turnout is 44% on average and ranges from 14% to 87%.

Average years of education, average household income, and average knowledge on proposition of the voting population are captured on the basis of post-vote surveys. Differ-

¹⁶Welfare expenditures offer limited opportunities for discretionary spending decisions and for the targeting of funds to specific industries or regions.

ent Swiss universities together with a private research institute (Schweizerische Gesellschaft für praktische Sozialforschung, GFS) carry out post-vote surveys after each ballot date (VOX surveys). We use the standardized cumulative file VoxIt. The sample period starts on June 14, 1981. The post-vote surveys contain information on whether and how respondents voted, their knowledge about ballot proposals, and their socio-economic characteristics.

Respondents level of education is captured by the highest degree they attained. Based on information provided by Swiss Conference of Cantonal Ministers of Education, we translate the degrees into years of education. Household income is reported in bands. Based on this information, we estimate the distribution function of income for each year, assuming a log-normal distribution of income, and then replace the grouped income variable by the respective group means (in 2010 CHF). Information on household income is only available since 1993. Respondents knowledge on the ballot proposition is expressed on a three-point scale. The respective variable takes value 0 for respondents who remember neither the title nor the content of the proposition, value 1 for respondents who remember one of these, and value 2 for respondents who remember both title and content of the ballot.

Based on this information, we calculate average years of education, average household income, and average knowledge on propositions of voting *participants* for all states and ballot dates. For some states and dates there are no respondents or, alternatively, no respondents who voted. For the characteristics education and household income, we also calculate the average over all *respondents* per state and ballot date. These variables, later called population average of outcome, capture general state developments in education and income in a very flexible way. We do not calculate an analogous variable for knowledge on propositions because knowledge is endogenous to the participation decision (as theoretically modeled) whereas education and household income are exogenous to the participation decision.

As can be seen from the descriptive statistics in Table 1, participants in the ballots have a slightly higher level of education and more income (12.5 years and CHF 6,532) than the general population (12.3 years and CHF 6,282). Average knowledge of participants is 1.6 on the three-point scale ranging from 0 to 2.

[Table 1 about here]

Data on total expenditures and welfare expenditures in states are from an annual publication of the Federal Finance Administration on public finances (Öffentliche Finanzen der Schweiz, various years). On average, total state expenditures amount to 17.0% of state income, and welfare expenditures to 2.3%.

Our main explanatory variable is a dummy variable for postal voting (Luechinger et al. 2007).¹⁷ In our context, postal voting means that citizens get the ballot forms mailed to their home address, and can either go to the ballot box to vote or fill out the ballot forms and mail them back by a specified date in order to participate. The variable has been constructed on the basis of survey information from the federal chancellery, state corpora juris and a survey conducted with the chancelleries of the states. Since the late 1970s, Swiss states gradually introduced postal voting for all citizens without request. In earlier years, postal voting was restricted to selected groups (e.g., hospital- or home-bound patients) and/or only available upon request. The first state to introduce unrestricted postal voting was Basel-Landschaft (in 1978), and the latest states were Ticino and Valais (in 2005). In 23 out of the 26 states, the introduction of postal voting falls into our sample period.

Control variables at the state level are income per capita, population and the rate of unemployment. This data is from the FSO. We include these three variables both in

¹⁷Luechinger et al. (2007) provide a detailed description of the introduction of postal voting in Swiss states, the construction of the respective dummy variable, and estimates on the effect of postal voting on turnout. The discussion in this section abbreviates the more complete discussions of these issues in Luechinger et al. (2007).

levels and in growth rates.¹⁸ Data on state income is only available until 2005. In order to account for the population structure, we include the share of population below the age of 16 and above the age of 64. In the government expenditure regressions, we also include institutional and political variables that have been argued to affect spending levels and composition. The variables are the share of left-wing party members in parliament, a dummy for election years, a fiscal rule index, a dummy for states and years with mandatory fiscal referenda, the signature requirement to launch a voter initiative relative to the state population, the cabinet size and the parliament size. These institutional and political variables are from Schaltegger and Feld (2009), except for the fiscal rule index, which is from Feld et al. (2011).

In order to have a comparable sample across regressions, we restrict the sample period to the years 1981 to 2005, i.e., starting with the first year of post-vote survey information and ending with the last year with data on state income.

3.2 Estimation results

We present the results of our empirical analysis in three steps: i) voter turnout, ii) composition of the voting population and political knowledge, and iii) public finances.

3.2.1 Voter turnout

Table 2 shows the partial correlation between unrestricted optional postal voting and voter turnout at the level of Swiss states on 73 dates of national ballots between 1981 and 2005. Based on ordinary least squares estimates including state-specific and ballot date-specific effects, we find that postal voting leads to an increase in voting participation of 4.1 percentage points. The effect holds if a set of time variant control variables is included in

¹⁸As the unemployment rate was zero in the state Appenzell Inner Rhodes in eight years, we lose eight state-years by including the growth rate of unemployment.

the second specification of Table 2. The estimated coefficient for the variable postal voting now amounts to 3.9 percentage points, or 8.9% relative to the average turnout of 43.8% in our sample. This effect is statistically highly significant (t-value=4.36) whereby standard errors are adjusted for clustering at the state level. Of the control variables, the rate of unemployment is statistically significantly positively correlated with turnout whereas the other state level factors show no significant correlations. The evidence supports Proposition 1 and indicates that the reduction in voting costs due to the introduction of postal voting significantly increased turnout.

[Table 2 about here]

3.2.2 Composition of the voting population and political knowledge

The effects of postal voting on the composition of the voting population, i.e., participants average years of education and household income, are estimated with two specifications for both variables. In the baseline specifications, we include three sets of control variables. First, time invariant state-specific effects are taken into account. Second, ballot date-specific effects deal with issue specific mobilization of more or less educated people and of people with lower or higher income. Third, population averages of the outcome variables per state and ballot date control in a very flexible way for the development in the level of education and income over time. In the extended specifications, we include a set of time variant control variables capturing the socio-economic conditions in the states.

Table 3 presents the results. Access to voting by mail is related, on average, to a lower education level of the participants in national ballots. The average years of education is reduced by 0.089 or 0.085 years, respectively (with t-values of -2.23 and -1.76). While the effect of postal voting seems small in absolute terms, it corresponds to more than one third of the difference in the level of education of participants and non-participants in the entire sample, which is 0.219 years (i.e., 12.509 years - 12.290 years). The finding is

consistent with Proposition 2 that the skill level of participants is lower with lower voting costs. The control variable for the population average is positively related to the level of education of the participants with a coefficient slightly larger than one. This reflects that participants, on average, have a higher level of education than non-participants. From the set of additional control variables, growth of state income is statistically significantly negatively related to the participants' level of education.

[Table 3 about here]

Consistent with the findings for education, the average household income of participants is lower with postal voting. The estimated coefficients amount to CHF 79.6 and CHF 89.4, respectively. This is about a third of the average difference in voters and non-voters household income of CHF 250 (i.e., CHF 6532 - CHF 6282). However, the estimated partial correlations are not statistically significant. There are two reasons why we would expect a low precision of the coefficient estimates. First, survey information on household income is only available since 1993. Therefore, the household income regressions are based on both a smaller sample size and less identifying variation in the postal voting variable. Second, we construct the household income variable on the basis of categorized income information. Thus, household income is measured with an error. Since we use estimated group means rather than category midpoints, this measurement error is classical in form (Hsiao 1983). Still, it reduces the precision of the coefficient estimates.

Finally, Table 3 reports the effect of postal voting on participants average knowledge on propositions. We find that knowledge is statistically significantly lower by 0.051 (t-value=-2.06) and 0.047 (t-value=-1.92), respectively, whereby the mean value of this variable is 1.619. This evidence supports Proposition 2 of our model. Moreover, it shows that lower voting costs can have unintended side effects.¹⁹

¹⁹Remember that the estimation equation would be misspecified if we were to include the population

3.2.3 Public finances

Table 4 presents the results for the effects of postal voting on public finances. We estimate three specifications for total government expenditures as a share of state income, and three specifications for welfare expenditures as a share of state income. All estimations include state- and year-specific effects. The specifications differ in terms of the additional control variables. We first add the same time variant factors as in the estimations above. Second, we add a large set of political and institutional variables that have been studied in previous work on public finances in Swiss states (often in a cross-section context though).

We find no systematic partial correlation between postal voting and total government expenditures across our three specifications. In fact, when controlling for time-invariant state-specific differences and year-specific effects, the remaining variation in total government expenditures is only related to population size of the state and aggregate income in the state. Expenditures as a share of state income is lower with a larger population and - not surprisingly - also with a higher aggregate income. Thus, the results for total government expenditures support neither our model, nor other models in the spirit of Meltzer and Richard (1981) on the relationship between the composition of the voting population and government expenditures. We can think of two reasons for this (non-)result. First, while in our model rents are acquired through government expenditures, in reality special-interest groups might well benefit even more from favorable regulations allowing them to set higher prices for goods and services that they sell to consumers (and thus “tax” them indirectly). Second, relatively fierce tax competition between Swiss states greatly reduces the ability of these states to increase taxes and expenditures relative to other states. Indeed, total government expenditures in Swiss states have been found to mimic expenditure patterns of neighboring states (Schaltegger and Küttel 2002, Schaltegger 2004). In comparison, Swiss

average of knowledge on propositions as an additional control variable. Knowledge is endogenous to the participation decision (as theoretically modeled) whereas income and education are exogenous to the participation decision.

states have considerably more leeway in deciding on the composition than on the level of government expenditures, similarly to the situation modeled in Section 2.3.3.

[Table 4 about here]

According to the second set of estimations in Table 4, postal voting is statistically significantly negatively correlated with welfare expenditures. Welfare expenditures as a share of aggregate income in the state are lower by between 0.13 and 0.19 percentage points depending on the specification. Given that state government welfare expenditures are an expenditure category that is likely not to include rents for special-interest groups, we see the evidence as consistent with the – probably most controversial – second case in Proposition 7 that lower voting costs decrease public expenditures net of rents.²⁰

4 Conclusions

There is a common concern that voting costs with traditional voluntary voting at the poll put many citizens off participating in the process of democratic decision-making. Moreover, these costs contribute to an unequal representation with the better educated being more likely to participate. Accordingly, the plea is for lower voting costs (or higher costs of abstention, e.g., induced by compulsory voting). However, lower voting costs involve a trade-off: While they may reduce the representation bias, they may simultaneously lower the average participants' political knowledge and increase the bias from interest-group politics.

We substantiate this argument offering a theoretical model and some first evidence. In particular, we study how lower voting costs affect public goods provision and rents to

²⁰We have argued above that the model with exogenous total government expenditures (Section 2.3.3) might be more relevant in the Swiss context than our general model (Section 2.3.4). Proposition 4 shows that the prediction of lower public goods provision in response to lower voting costs is unambiguous in this context.

special-interest groups in a probabilistic voting model with campaign contributions. This model is fairly standard except that we allow the citizens to decide how much political knowledge to acquire, and whether or not to participate in the election. We show that lower voting costs (or higher costs of abstention) increase the share of uninformed voters, thereby making special-interest groups more influential. These groups thus receive more generous rents. Furthermore, we show that total government spending and taxes are higher with lower voting costs, while public goods provision may be higher or lower. Lower voting costs may thus well lead to policies that make even less privileged citizens worse off.

Consistent with the main propositions of our model, we find in an empirical analysis for 26 Swiss states that lower voting costs due to postal voting are related to higher turnout and lower average education of participants as well as lower knowledge on the political issues they were deciding on. Moreover, we observe that the introduction of postal voting is related to lower - and not higher - government welfare expenditures.

Overall, we want to submit that high participation in democratic decision-making is not a value in itself. Rather participants' knowledge on the political decisions at stake is crucial. Lowering voting costs to increase participation might have rather negative side effects when special-interest groups are attracted that try to influence the less well informed in the voting population.

Appendix: Proofs

Proof of Proposition 3: The interior solution of maximization problem (5) must satisfy the first-order condition

$$\int_{2\gamma}^1 \alpha^i \left[\frac{-\alpha^i}{\alpha} U'(c_P^i) + H'(g_P) \right] f(\alpha^i) d\alpha^i = 0, \quad (7)$$

where $c_P^i = (1 - \tau_P)\alpha^i$ and $\tau_P = \frac{g_P + \bar{r}}{\alpha}$. It is straightforward to show that the second-order condition holds. Denote the left-hand side of (7) by k_r . Note that $\frac{\partial k_r}{\partial g_P} = \int_{2\gamma}^1 \alpha^i \left[\left(\frac{-\alpha^i}{\alpha} \right)^2 U''(c_P^i) + H''(g_P) \right] f(\alpha^i) d\alpha^i < 0$. It follows from Leibniz's rule that $\frac{\partial k_r}{\partial \gamma} = -4\gamma \left[\frac{-2\gamma}{\alpha} U'(\hat{c}_P) + H'(g_P) \right] f(2\gamma)$, where $\hat{c}_P = (1 - \tau_P)2\gamma$. Observe that $\frac{\partial \left[\frac{-\alpha^i}{\alpha} U'(c_P^i) + H'(g_P) \right]}{\partial \alpha^i} = -\frac{1}{\alpha} [U'(c_P^i) + c_P^i U''(c_P^i)] = \frac{1}{\alpha} U'(c_P^i) [R_R(c_P^i) - 1] < 0$, where the inequality follows from our assumption that $R_R(c_P^i) < 1$ for all c_P^i . Therefore it follows from (7) and $2\gamma < 1$ that $\left[\frac{-2\gamma}{\alpha} U'(\hat{c}_P) + H'(g_P) \right] > 0$ and, consequently, that $\frac{\partial k_r}{\partial \gamma} < 0$. The implicit function theorem then implies $\frac{\partial g_P}{\partial \gamma} = -\frac{\frac{\partial k_r}{\partial \gamma}}{\frac{\partial k_r}{\partial g_P}} < 0$, which implies $\frac{\partial r_P}{\partial \gamma} > 0$. ■

Proof of Proposition 4: The interior solution of maximization problem (6) must satisfy the first-order condition

$$\int_{2\gamma}^1 [\alpha^i H'(g_P) - (1 - \alpha^i) \Omega J'(r_P)] f(\alpha^i) d\alpha^i = 0. \quad (8)$$

It is straightforward to show that the second-order condition holds. Denote the left-hand side of (8) by k_τ . Note that $\frac{\partial k_\tau}{\partial g_P} = \int_{2\gamma}^1 [\alpha^i H''(g_P) + (1 - \alpha^i) \Omega J''(r_P)] f(\alpha^i) d\alpha^i < 0$, and $\frac{\partial k_\tau}{\partial \Omega} = -\int_{2\gamma}^1 (1 - \alpha^i) J'(r_P) f(\alpha^i) d\alpha^i < 0$. It follows from Leibniz's rule that $\frac{\partial k_\tau}{\partial \gamma} = -2 [2\gamma H'(g_P) - (1 - 2\gamma) \Omega J'(r_P)] f(2\gamma)$. Observe that $\frac{\partial [\alpha^i H'(g_P) - (1 - \alpha^i) \Omega J'(r_P)]}{\partial \alpha^i} = H'(g_P) + \Omega J'(r_P) > 0$. Therefore it follows from (8) and $2\gamma < 1$ that $[2\gamma H'(g_P) - (1 - 2\gamma) \Omega J'(r_P)] < 0$ and, consequently, $\frac{\partial k_\tau}{\partial \gamma} > 0$. The implicit function theorem then implies $\frac{\partial g_P}{\partial \Omega} < 0$ and $\frac{\partial g_P}{\partial \gamma} > 0$. It follows that $\frac{\partial r_P}{\partial \Omega} > 0$ and $\frac{\partial r_P}{\partial \gamma} < 0$. ■

Proof of Proposition 5: The interior solution of maximization problem (4) must satisfy the first-order conditions

$$\int_{2\gamma}^1 \left[\frac{-(\alpha^i)^2}{\alpha} U'(c_P^i) + \alpha^i H'(g_P) \right] f(\alpha^i) d\alpha^i = 0 \quad (9)$$

and

$$\int_{2\gamma}^1 \left[\frac{-(\alpha^i)^2}{\alpha} U'(\hat{c}_P) + (1 - \alpha^i) \Omega J'(r_P) \right] f(\alpha^i) d\alpha^i = 0. \quad (10)$$

It is straightforward to show that the second-order conditions hold. Denote the left-hand side of (9) by k_1 , and the left-hand side of (10) by k_2 . It follows that $\frac{\partial k_1}{\partial g_P} = K_U + K_H$, $\frac{\partial k_2}{\partial g_P} = \frac{\partial k_1}{\partial r_P} = K_U$, and $\frac{\partial k_2}{\partial r_P} = K_U + K_J$, where $K_U \equiv \int_{2\gamma}^1 \frac{(\alpha^i)^3}{\alpha^2} U''(\hat{c}_P) f(\alpha^i) d\alpha^i \leq 0$, $K_H \equiv H''(g_P) \int_{2\gamma}^1 \alpha^i f(\alpha^i) d\alpha^i < 0$, and $K_J \equiv \Omega J''(r_P) \int_{2\gamma}^1 (1 - \alpha^i) f(\alpha^i) d\alpha^i < 0$. Further it holds that $\frac{\partial k_1}{\partial \Omega} = 0$ and $\frac{\partial k_2}{\partial \Omega} > 0$; and it follows from Leibniz's rule that $\frac{\partial k_1}{\partial \gamma} = -2 \left[\frac{-4\gamma^2}{\alpha} U'(\hat{c}_P) + 2\gamma H'(g_P) \right] f(2\gamma)$ and $\frac{\partial k_2}{\partial \gamma} = -2 \left[\frac{-4\gamma^2}{\alpha} U'(\hat{c}_P) + (1 - 2\gamma) \Omega J'(r_P) \right] f(2\gamma)$.

The implicit function theorem states that

$$\begin{pmatrix} \frac{\partial g_P}{\partial \gamma} \\ \frac{\partial r_P}{\partial \gamma} \end{pmatrix} = -B \begin{pmatrix} \frac{\partial k_2}{\partial r_P} & -\frac{\partial k_1}{\partial r_P} \\ -\frac{\partial k_2}{\partial g_P} & \frac{\partial k_1}{\partial g_P} \end{pmatrix} \begin{pmatrix} \frac{\partial k_1}{\partial \gamma} \\ \frac{\partial k_2}{\partial \gamma} \end{pmatrix}$$

with $B \equiv \begin{bmatrix} \frac{\partial k_1}{\partial g_P} & \frac{\partial k_2}{\partial r_P} \\ \frac{\partial k_1}{\partial r_P} & \frac{\partial k_2}{\partial g_P} \end{bmatrix}^{-1}$. Hence

$$\frac{\partial g_P}{\partial \gamma} = 2Bf(2\gamma) \left\{ K_U [2\gamma H'(g_P) - (1 - 2\gamma) \Omega J'(r_P)] + K_J \left[\frac{-4\gamma^2}{\alpha} U'(\hat{c}_P) + 2\gamma H'(g_P) \right] \right\}, \quad (11)$$

$$\frac{\partial r_P}{\partial \gamma} = 2Bf(2\gamma) \left\{ K_U [(1 - 2\gamma) \Omega J'(r_P) - 2\gamma H'(g_P)] + K_H \left[\frac{-4\gamma^2}{\alpha} U'(\hat{c}_P) + (1 - 2\gamma) \Omega J'(r_P) \right] \right\}, \quad (12)$$

and, consequently,

$$\frac{\partial(g_P + r_P)}{\partial \gamma} = 2Bf(2\gamma) \left\{ K_J \left[\frac{-4\gamma^2}{\alpha} U'(\hat{c}_P) + 2\gamma H'(g_P) \right] + K_H \left[\frac{-4\gamma^2}{\alpha} U'(\hat{c}_P) + (1 - 2\gamma) \Omega J'(r_P) \right] \right\}. \quad (13)$$

We know that $K_J < 0$ and $K_H < 0$, and it is easy to show that $B > 0$. Hence it remains to determine whether the two terms in square brackets in (13) are positive or negative. As shown in the proof of Proposition 3, it holds that $\frac{\partial \left[\frac{-\alpha^i}{\alpha} U'(\hat{c}_P) + H'(g_P) \right]}{\partial \alpha^i} < 0$. It then follows from (9) and $2\gamma < 1$ that $\left[\frac{-4\gamma^2}{\alpha} U'(\hat{c}_P) + 2\gamma H'(g_P) \right] > 0$. It further holds that

$\frac{\partial \left[\frac{-(\alpha^i)^2 U'(c_P^i) + (1-\alpha^i)\Omega J'(r_P)}{\partial \alpha^i} \right]}{\partial \alpha^i} = -\frac{\alpha^i}{\alpha} [2U'(c_P^i) + c_P^i U''(c_P^i)] - \Omega J'(r_P) < 0$, where the inequality holds since $R_R(c_P^i) < 1$ implies $U'(c_P^i) + c_P^i U''(c_P^i) > 0$. It then follows from (10) and $2\gamma < 1$ that $\left[\frac{-4\gamma^2 U'(\hat{c}_P) + (1-2\gamma)\Omega J'(r_P)}{\alpha} \right] > 0$. Together with (13), these results imply $\frac{\partial(g_P+r_P)}{\partial \gamma} < 0$. Consequently, $\frac{\partial r_P}{\partial \gamma} < 0$.

The implicit function theorem further implies $\frac{\partial g_P}{\partial \Omega} = B \frac{\partial k_1}{\partial r_P} \frac{\partial k_2}{\partial \Omega} \leq 0$, $\frac{\partial r_P}{\partial \Omega} = -B \frac{\partial k_1}{\partial g_P} \frac{\partial k_2}{\partial \Omega} > 0$, and $\frac{\partial(g_P+r_P)}{\partial \Omega} = B \left[\frac{\partial k_1}{\partial r_P} - \frac{\partial k_1}{\partial g_P} \right] \frac{\partial k_2}{\partial \Omega} = -BK_H \frac{\partial k_2}{\partial \Omega} > 0$, where all inequalities directly follow from results derived above. Consequently, $\frac{\partial r_P}{\partial \Omega} > 0$. ■

Proof of Proposition 6: It is shown in the proof of Proposition 5 that $\frac{\partial r_P}{\partial \Omega} < 0$. There I further show that $B > 0$, $K_U \leq 0$, $K_H < 0$, and $\left[\frac{-4\gamma^2 U'(\hat{c}_P) + (1-2\gamma)\Omega J'(r_P)}{\alpha} \right] > 0$. Therefore it follows from (12) that $\frac{\partial r_P}{\partial \gamma} < 0$ if $[(1-2\gamma)\Omega J'(r_P) - \gamma H'(g_P)] \geq 0$. It follows from conditions (9) and (10) that

$$\int_{2\gamma}^1 [(1-\alpha^i)\Omega J'(r_P) - \alpha^i H'(g_P)] f(\alpha^i) d\alpha^i = 0. \quad (14)$$

Observe that $\frac{\partial [(1-\alpha^i)\Omega J'(r_P) - \alpha^i H'(g_P)]}{\partial \alpha^i} = -\Omega J'(r_P) - H'(g_P) < 0$. Therefore condition (14) and $2\gamma < 1$ imply $[(1-2\gamma)\Omega J'(r_P) - 2\gamma H'(g_P)] > 0$. Consequently, $\frac{\partial r_P}{\partial \gamma} < 0$. ■

Proof of Proposition 7: It is shown in the proof of Proposition 5 that $\frac{\partial g_P}{\partial \Omega} \leq 0$.

Assume for the moment that $U(c_P^i) = \chi c_P^i$ with $\chi > 0$. Then $U''(c_P^i) = 0$, such that $K_U = 0$. Hence (11) reduces to $\frac{\partial g_P}{\partial \gamma} = 2Bf(2\gamma)K_J \left[\frac{-4\gamma^2 U'(\hat{c}_P) + 2\gamma H'(g_P)}{\alpha} \right]$. It is shown in the proof of Proposition 5 that $B > 0$, $K_J < 0$, and $\left[\frac{-4\gamma^2 U'(\hat{c}_P) + 2\gamma H'(g_P)}{\alpha} \right] > 0$. It follows that $\frac{\partial g_P}{\partial \gamma} < 0$.

Assume now that $R_R(c_P^i) = \theta$ with $\theta \rightarrow 1$ (or $\theta = 1$). Then $\frac{\partial \left[\frac{-\alpha^i U'(c_P^i) + H'(g_P)}{\partial \alpha^i} \right]}{\partial \alpha^i} \rightarrow 0$, such that $\left[\frac{-4\gamma^2 U'(\hat{c}_P) + 2\gamma H'(g_P)}{\alpha} \right] \rightarrow 0$. Hence it follows from (11) that $\frac{\partial g_P}{\partial \gamma} \rightarrow 2Bf(2\gamma)K_U [2\gamma H'(g_P) - (1-2\gamma)\Omega J'(r_P)]$. It is shown in the proofs of Propositions 5 and 6 that $B > 0$ and $[2\gamma H'(g_P) - (1-2\gamma)\Omega J'(r_P)] < 0$, respectively. Further, $R_R(c_P^i) > 0$ implies $U''(c_P^i) < 0$ and, consequently, $K_U < 0$. It follows that $\frac{\partial g_P}{\partial \gamma} > 0$. ■

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Table 1: Descriptive statistics

	No. of obs.	Mean	Std. dev.	Min.	Max.
A. Turnout regressions					
Turnout	1870	0.438	0.118	0.138	0.872
Postal voting	1870	0.489	0.500	0.000	1.000
B. Education and knowledge regressions					
Avrg. years of education of participants	1394	12.509	0.998	9.000	17.000
of general population	1394	12.290	0.825	9.000	17.000
Avrg. knowledge on propositions of participants	1394	1.619	0.288	0.000	2.000
Postal voting	1394	0.604	0.489	0.000	1.000
C. Income regressions					
Avrg. household income of participants	910	6532	1346	2487	12639
of general population	910	6282	1069	2553	12561
Postal voting	910	0.793	0.405	0.000	1.000
D. Expenditure regressions					
Total expenditures (% of state inc.)	639	0.170	0.057	0.044	0.358
Welfare expenditures (% of state inc.)	639	0.023	0.013	5.0E-4	0.066
Postal voting	639	0.473	0.500	0.000	1.000
Population	639	271201	279351	14145	1292481
Growth of population	639	0.007	0.007	-0.010	0.070
Share under 16	639	0.188	0.024	0.116	0.247
Share over 64	639	0.151	0.021	0.105	0.214
State income p.c.	639	40416	13508	19168	115180
Growth of state income p.c.	639	0.036	0.043	-0.170	0.420
Unemployment rate	639	2.077	1.791	0.030	7.810
Growth of unemployment rate	639	0.268	0.683	-0.590	3.630
Share of left-wingers in parliament	639	0.228	0.127	0.000	0.530
Election year	639	0.260	0.439	0.000	1.000
Fiscal rule index	639	0.397	0.900	0.000	3.000
Mandatory fiscal referendum	639	0.643	0.479	0.000	1.000
Signature requirement initiative, relative	639	0.015	0.010	1.8E-5	0.039
Cabinet size	639	6.277	1.118	5.000	9.000
Parliament size	639	116	47	46	200

Notes: Data refers to the sample period 1981 to 2005. Observations in panels A, B and C are at the state-ballot date level while those in panel D are at the state-year level.

Data sources: Luechinger et al. (2007), Schaltegger and Feld (2009), Feld et al. (2011), Swiss Federal Statistical Office, Swiss Federal Finance Administration, and VoxIt.

Table 2: Postal voting and voter turnout in federal ballots in Switzerland for 1981 to 2005

Dependant variable	Turnout	
	(I)	(II)
Postal voting	0.041*** (0.009)	0.039*** (0.009)
Population in 1'000'000		-0.042 (0.332)
Growth of population		0.188 (0.226)
Share under 16		0.756 (0.720)
Share over 64		-0.268 (0.579)
State income p.c. in 100'000		-0.010 (0.059)
Growth of state income p.c.		0.004 (0.048)
Unemployment rate		0.007* (0.004)
Growth of unemployment rate		0.006 (0.005)
State-specific effects	Yes	Yes
Ballot date-specific effects	Yes	Yes
No. of obs.	1870	1870
No. of clusters	26	26
R^2 within	0.75	0.75

Notes: OLS estimations. Robust standard errors in parentheses. Standard errors are adjusted for clustering at the level of states. ***, **, and * indicate significance level at 1%, 5%, and 10%, respectively.

Data sources: Luechinger et al. (2007), and Swiss Federal Statistical Office.

Table 3: Postal voting, the composition of the voting population and political knowledge in federal ballots in Switzerland for 1981 to 2005

Dependent variable	Avg. years of education of participants		Avg. household income of participants ^{a)}		Avg. knowledge on propositions of participants ^{b)}	
	(I)	(II)	(I)	(II)	(I)	(II)
Postal voting	-0.089** (0.040)	-0.085* (0.048)	-79.610 (94.249)	-89.484 (92.618)	-0.051* (0.025)	-0.047* (0.024)
Population avrg. of outcome	1.031*** (0.022)	1.026*** (0.023)	1.069*** (0.027)	1.071*** (0.029)		
Population in 1'000'000		-0.050 (0.824)		-11.232 (2.1E+4)		0.741* (0.413)
Growth of pop.		-0.394 (2.575)		1.7E+3 (5.1E+3)		-0.442 (0.824)
Share under 16		-3.074 (3.323)		-9.2E+3 (7.9E+3)		-2.711* (1.434)
Share over 64		0.504 (2.151)		-1.7E+04 (1.4E+4)		-0.329 (1.525)
State income p.c. in 100'000		0.197 (0.296)		-683.130 (760.215)		0.195 (0.144)
Growth of state income p.c.		-1.073*** (0.372)		446.698 (830.392)		-0.040 (0.164)
Unemployment rate		-0.020 (0.025)		-31.244 (44.466)		0.005 (0.013)
Growth of unempl. rate		0.089 (0.074)		330.065 (265.717)		0.012 (0.025)
State-specific effects	Yes	Yes	Yes	Yes	Yes	Yes
Ballot date-specific effects	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	1394	1394	910	910	1394	1394
No. of clusters	26	26	26	26	26	26
R ² within	0.74	0.74	0.69	0.69	0.59	0.60

General notes: OLS estimations. Robust standard errors in parentheses. Standard errors are adjusted for clustering at the level of states. The regressions based on the survey data have fewer observations than the turnout regressions in Table 2 because for some ballot dates, surveys do not contain respondents from all states. ***, **, and * indicate significance level at 1%, 5%, and 10%, respectively.

Specific notes: a) Information is only available since 1993. Household income is reported in categories. We use this information to estimate the distribution function of income and then replace the grouped income variable by the respective group means (in 2010 CHF). b) Since knowledge of the proposition is clearly endogenous, it makes no sense in this case to include avrg. knowledge of the population at large.

Data sources: Luechinger et al. (2007), Swiss Federal Statistical Office, and VoxIt.

Table 4: Postal voting and public expenditures of Swiss states for 1981 to 2005

Dependent variable	Total expenditures			Welfare expenditures		
	(I)	(II)	(III)	(I)	(II)	(III)
Postal voting	-0.003 (0.005)	0.001 (0.003)	-0.001 (0.003)	-0.002** (0.001)	-0.001* (0.001)	-0.001** (0.001)
Population in 1'000'000		-0.274* (0.156)	-0.325* (0.188)		-0.052** (0.021)	-0.059*** (0.019)
Growth of population		0.055 (0.142)	0.085 (0.144)		0.033 (0.025)	0.032 (0.024)
Share under 16		0.065 (0.215)	0.031 (0.272)		0.121** (0.044)	0.115** (0.049)
Share over 64		0.089 (0.205)	0.059 (0.199)		0.066** (0.031)	0.061* (0.032)
State income p.c. in 100'000		-0.281*** (0.050)	-0.286*** (0.050)		-0.048*** (0.006)	-0.049*** (0.006)
Growth of state income p.c.		-0.016 (0.014)	-0.013 (0.014)		-0.007 (0.004)	-0.007 (0.004)
Unemployment rate		0.003 (0.003)	0.003 (0.003)		0.001** (3.9E-4)	0.001** (4.0E-4)
Growth of unemployment rate		-0.001 (0.003)	-0.002 (0.003)		-2.3E-4 (3.3E-4)	-2.6E-4 (3.3E-4)
Share of left-wingers in parliament			0.049 (0.037)			0.003 (0.007)
Election year			0.001 (0.001)			-2.0E-5 (1.6E-4)
Fiscal rule index			0.001 (0.002)			2.2E-4 (4.8E-4)
Mandatory fiscal referendum			-0.003 (0.009)			-0.001* (0.001)
Signature requirement initiative, relative			-0.864 (0.899)			-0.149 (0.114)
Cabinet size			-0.004 (0.004)			-0.001 (3.9E-4)
Parliament size			-5.8E-5 (1.4E-4)			1.9E-5 (2.2E-5)
State-specific effects	Yes	Yes	Yes	Yes	Yes	Yes
Year-specific effects	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	639	639	639	639	639	639
No. of clusters	26	26	26	26	26	26
R^2 within	0.57	0.72	0.73	0.84	0.91	0.91

Notes: OLS estimations. Standard errors are adjusted for clustering at the level of states. ***, **, and * indicate significance level at 1%, 5%, and 10%, respectively.

Data sources: Luechinger et al. (2007), Schaltegger and Feld (2009), Feld et al. (2011), Swiss Federal Statistical Office, and Swiss Federal Finance Administration.