

# How do Electoral Systems Affect Fiscal Policy? Evidence from State and Local Governments, 1890 to 2005

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## **Abstract**

Using a newly collected data set from 1890 to today, we estimate how the adoption of proportional representation affects policies in Swiss cantons. We show that proportional systems tilt spending toward public goods like education and welfare benefits but decrease spending for targeted transfers like roads and agricultural subsidies. However, we find little evidence that proportional representation increases the size of government. We also demonstrate that compositional changes of the legislature, i.e. party fragmentation and better representation of left-wing parties, are associated with more spending, while the direct electoral incentives of proportional rule appear to reduce government spending.

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# 1 Introduction

A central issue in modern democracies is how to delegate decision-making power to political representatives. On the one hand, it is desirable in a democracy that elected candidates represent the whole electorate, not just a select few. On the other hand, politicians should be held accountable to the voters for their decisions.

A growing body of research in political economy has shown that political institutions fundamentally shape electoral incentives of politicians and hence policy choices. In this article, we test how one such important political institution, the electoral system, affects public policies. Electoral systems, which can be broadly classified as either proportional or plurality systems, solve the basic tradeoff between representation and accountability in different ways.

Proportional systems grant political representation to all groups in the legislature according to their share of votes. However, since proportional representation often generates multi-party governments, it is possibly more difficult to hold politicians accountable to the voter. In plurality systems, only the candidate with the majority of votes is elected. While this implies that politicians do typically not represent the whole electorate, it might generate stiffer electoral competition and fewer decision-makers which foster accountability.

To investigate how these differences influence public policies, we use the exemplary case of Switzerland. The Swiss setting has a number of attractive features to study the impact of proportional representation. First, Switzerland's federalist system created considerable variation in electoral rules within the boundaries of the same country. Some states ('cantons') use a proportional and others a plurality system to elect their parliament. Hence, we can rely on institutional variation at the sub-national level to carefully analyze the link

between electoral system and public policies. Since all cantons share a common history, our study reduces problems of unquantifiable historical and institutional differences inherent in previously used cross-country data. An analysis at the state level is especially attractive because electoral systems typically vary along many dimensions across countries, which are difficult to characterize with existing data (but see Milesi-Ferretti et al., 2002).

Further, we investigate the effects of a historical milestone, the switch from plurality rule to proportional representation, for policy choices. In 1890, all cantons, like all democratic countries in Europe and elsewhere, elected their state legislatures under a plurality system. Over the next 110 years, 23 of the 25 cantons switched to proportional representation, followed by many other countries like Germany, France, Belgium, Spain or Ireland. Today, only two cantons exclusively rely on plurality rule to elect their parliament. Hence, we can exploit the differential timing of adoption across cantons to identify the influence of the electoral system on public policies.

Third, we are able to exploit rare exogenous variation in electoral rules at the local level to address the problem of policy endogeneity (Acemoglu, 2005; Aghion et al., 2004). In particular, many cantons in Switzerland mandate the electoral rule for selecting local parliaments and governments. Since these mandates have been imposed by the cantons typically several decades ago, they can be considered exogenous from the perspective of the individual community.

Finally, our analysis uses an unusually rich historical data set we collected from archival and published sources. In particular, we have detailed information on the electoral system, public spending as well as political and socio-economic characteristics of each canton spanning from the late 19th century until today. The data allows us, for instance, to isolate the direct incentive effect of changes in the electoral rule from compositional changes in the

legislature following the adoption of proportional representation.

Our findings suggest that proportional representation has strong effects on the scope of government: it shifts spending away from targeted transfers for roads and agricultural subsidies toward spending on education and welfare that benefit broad social groups. In particular, we find that a proportional system raises education expenditures by 12 percent, welfare expenditures by 30 percent, but also decreases road expenditures by 50 percent and agricultural subsidies by 21 percent.

We find however little evidence for the concern that proportional representation leads to larger governments. In the Swiss case, there does not seem to be a tradeoff between better representation of the citizens and the overall level of spending. It turns out that the absence of an effect on overall spending is driven by opposing forces. On the one hand, changes in the composition of the legislature after electoral reform increase spending. Specifically, the more fragmented legislature is associated with 3.6 percent more spending, while the better representation of left-wing interests adds another 5.7 percent. Conditional on these compositional changes, the proportional rule shifts electoral incentives in the direction of lower spending by 6.5 percent.

To address the potential endogeneity of the switch to proportional representation, we employ several strategies: first, we include in our empirical specification variables that the historical literature considers important determinants of electoral reform. Second, we complement our state-level findings using information from local governments in Switzerland. Specifically, we use the fact that many cantons mandate either proportional or majority rule for electing local governments. Our results using those mandates and matching confirm that spending is not systematically higher in communities with proportional rule.

Finally, a number of additional informal validity tests bolster the findings in this article.

Specifically, our results are qualitatively similar if we estimate the spending equation as a dynamic relationship or in first differences to control for time-varying heterogeneity. In addition, our results are robust to the inclusion of a variety of other political or social changes and alternative specifications of the dependent or independent variables. In addition, there are few meaningful correlations between the timing of adoption of proportional representation and socio-economic characteristics or other major policy changes at the time. Besides, we find no relationship between the adoption of proportional representation and selective migration. Taken together, these results suggest that it was the adoption of proportional representation itself that shifted the scope of government but did not increase its overall size.

The analysis in this article is closest in spirit to recent cross-country studies on the link between electoral systems and fiscal policy (Aidt et al., 2005; Milesi-Ferretti, Perotti and Rostagno, 2002; Persson and Tabellini, 1999; 2003; 2004). For the reasons discussed above, we view our analysis as complementary to the existing empirical literature.<sup>1</sup>

We also contribute to the recent theoretical and empirical literature on political representation which analyzes electoral incentives or changes in the number of decision-makers (Austen-Smith, 2000; Besley and Preston, 2007; Coate and Knight, 2007; Lizzeri and Persico, 2005; Persson, Roland and Tabellini, 2006). Our goal is instead to quantify the relative importance of electoral incentives and changes in the legislature for public spending. A second difference is that our study focuses on the important shift from one major electoral system, plurality rule, to the newer proportional system.

Furthermore, we provide evidence that the rising political influence of left-wing parties is associated with more government. While this link has been demonstrated by several

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<sup>1</sup>One other paper uses microdata from Italy to compare the behavior of politicians elected under proportional system to those elected under majority rule (Gagliarducci et al., 2007). Though they do not focus on public spending, their results support the view that a majoritarian electoral system creates incentives for pork barreling.

studies for the post-war period (see, for example, Blais et al., 1993; Pettersson-Lidbom, 2008; Tavares, 2004), we show that the positive correlation also holds for the whole period between 1890 and 2000.

Finally, the article is relevant for a large literature studying the link between fragmentation in political decision-making and the size of government (see, for example, Alesina and Perotti, 1995; Baqir, 2002; Kontopoulos and Perotti, 1999; Stein, Talvi and Grisanti, 1999). The focus in this paper is in contrast on how the electoral system, which is a crucial determinant of political fragmentation (Duverger, 1954; Lijphart, 1990), affects spending. Our setting further allows us to quantify the contribution of political fragmentation relative to other changes in political representation and electoral incentives.

## 2 Conceptual Framework

Electoral systems can be broadly classified as proportional or plurality systems. In a proportional system, seats in the legislature are distributed in a small number of (or even a single) voting district and are assigned based on the share of votes for the candidate's party. In contrast, candidates in a plurality system are usually elected in a large number of voting districts. In the extreme case, each district elects only a single representative. The seat is then awarded to the candidate with the highest share of votes in that district (*first-past-the-post system*).<sup>2</sup> We now discuss how these differences affect policy outcomes.

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<sup>2</sup>In addition, electoral systems also vary along other dimensions: in particular, whether voters choose individual candidates rather than party lists and whether they can cast multiple votes for a single candidate (see Taagepera and Shugart, 1989; Lijphart, 1994; and Cox, 1997 for more details on real-world electoral systems). We discuss these in more detail in Section 5.4 below.

## 2.1 Electoral Incentives

In a plurality system with two parties, winning an election requires at most fifty percent of the votes in fifty percent of the districts (or 25 percent of all votes). To gain the majority of seats in a proportional system however requires at least 50 percent of all votes.<sup>3</sup> Hence, the winning coalition is larger in a proportional than in a plurality system.

As a consequence, support-maximizing candidates running in a proportional system need the support of large segments of the electorate, which favors spending on public goods and other programs that benefit the population at large. In contrast, politicians in majoritarian systems have an incentive to target to voters in highly contested districts. The reason is that the political benefit of a 50 percent vote share (or the relative majority) is much higher than the return to a 70 percent or a 20 percent vote share. Hence, we expect that spending is more tilted toward specific geographic groups through subsidies or other targetable projects (Lizzeri and Persico, 2001; Milesi-Ferretti et al., 2002; Persson and Tabellini, 2000).

How the different electoral incentives affect overall spending is an open question. Total government spending might be higher or lower in proportional systems depending on voter preferences over targetable spending relative to broad transfers and private consumption (Milesi-Ferretti et al., 2002; Persson and Tabellini, 2000). There is a second reason why we cannot sign the impact of proportional rule on the overall size of spending. On the one hand, competition among a given number of candidates is typically stronger in a plurality system because of the high return to winning the majority of votes (Persson and Tabellini, 1999; 2000). On the other hand, plurality system might also create barriers to entry because

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<sup>3</sup>This effect gets stronger the more districts the plurality system has. If a representative is elected in a nationwide district (as in many proportional systems), she requires 50 percent of the votes. If the same district were split into three districts of equal size, only 33.4 percent (50 percent in 2 districts) would be required to win an absolute majority.

only one candidate can win the majority (Myerson, 1993). Hence, electoral competition, which typically reduces wasteful spending and rent-seeking, might be higher or lower in a plurality system.

## 2.2 Changes in the Legislature and Representation

Most of the available theoretical models assume two-party competition (but see Lizzeri and Persico, 2005) and hence take the composition of the legislature as given. However, electoral systems also have an impact on who is elected and represented in the legislature. A large literature in political science has documented that proportional systems increase the number of parties in the legislature and hence the probability of coalition governments (Duverger, 1954; Rae, 1967; Lijphart, 1990; Persson, Roland and Tabellini, 2006; Taagepera and Shugart, 1989).

How does that affect government spending? Suppose the benefits of government spending are concentrated among relatively narrow group of beneficiaries, whereas the costs are shared among all taxpayers (Weingast, Shepsle and Johnson, 1981). Political fragmentation then creates a “common-pool problem” where each party in a coalition favors more spending, for which they or their voters are the beneficiary but have to pay only a fraction of the cost.<sup>4</sup> The distortion in incentives results in higher spending and will be stronger the more people are involved in the decision-making over the budget (Austen-Smith, 2000; Bawn and Rosenbluth, 2006; Kontopoulos and Perotti, 1999; Lizzeri and Persico, 2005; Persson, Roland and Tabellini, 2006).

The switch to proportional representation could also affect whose interests are represented

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<sup>4</sup>A large public finance literature has stressed the importance of common-pool problems for delaying fiscal adjustment (see for example, Alesina and Perotti, 1995; Hallerberg and von Hagen, 1999; or, Stein, Talvi and Gisanti, 1999).

in the political process. Under plurality system, only groups or parties that achieve 51 percent of the votes in at least one district gain parliamentary seats. This characteristic may exclude small minorities and even larger groups that are spread across multiple districts from political representation.

Since under proportional representation parties gain seats according to their share of votes in the electorate, electoral reform might change the set of interests (‘ideologies’) represented by political candidates. To the extent that the preferences for government among these newly represented groups differ from those of the established parties, spending might increase or decrease.

In sum, our discussion yields the following predictions: first, governments elected in a proportional system provide more spending for broad groups of society but spend less on narrowly defined geographic constituencies. Second, the overall effect of a proportional system on the size of government is theoretically ambiguous. Third, spending will be higher in cantons where electoral reform results in more fragmented parliaments and the representation of groups with demand for more government. Before taking these hypotheses to the data, we introduce the Swiss historical context.

## **3 Historical Background<sup>5</sup>**

### **3.1 From Plurality to Proportional Systems**

Historically, parliaments around the world were elected according to plurality rule. Likewise in Switzerland, all twenty-five cantons had a plurality system in place at the beginning of

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<sup>5</sup>This section builds on Gruner (1977), Klöti (1901), Saripolos (1899) and Vatter (2002). Detailed discussions of the Swiss electoral system can be found in Garrone (1991), Giacometti (1941), Kölz (1987), Lutz and Strohmman (1998), Moser (1987) and Poledna (1988).

our sample period in 1890.<sup>6</sup> Between 1890 and 1992, 23 out of the 25 cantons switched to proportional representation.<sup>7</sup> The first column of table 1 shows the year when each canton first elected the legislature under the new rule. Today, only two cantons, *Appenzell-Innerrhode* and *Grisons*, still rely exclusively on plurality rule. A few cantons (see column (2) of table 1) use a mixed proportional system, which we count as proportional representation. For example, *Uri* adopted the proportional system in 1992 in districts with more than two mandates, i.e. about three-quarters (or 47 out of 64) of its voting districts. Since the timing of electoral reform is important for evaluating the validity of this paper’s empirical strategy, we next discuss the forces driving adoption of proportional representation in the cantons.

### 3.2 Political Struggle for Proportional Representation

Switzerland’s population has been religiously divided between Catholics and Protestants ever since the reformation. This ideological split led to several violent clashes, for example, the war in 1847 (*Sonderbundskrieg*) and the cultural conflict (*Kulturkampf*) of the 1870s.<sup>8</sup> In the political arena, this division was mirrored in the long-lasting struggle between Conservative forces supported by the Catholic population and the liberal-radical movement backed by the Protestants. Only in a few cantons was one party able to maintain political dominance over a prolonged period of time. In many other cases, alternating majorities and more or less temporary coalitions between liberal and conservative groups were the rule rather than the

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<sup>6</sup>A few cantons (for example, *Geneva*) exclusively relied on plurality rule where the candidate with the largest share of votes in each district is elected. Most cantons however rely on a mixture of majority and plurality rule. Hence, the absolute majority of votes (50 percent) is required in the first round, while in the second round only the relative majority among the remaining candidates is needed to win a seat.

<sup>7</sup>The canton *Jura* was founded in 1978 and hence is excluded from the analysis.

<sup>8</sup>While the conflict in 1847 largely took place between Catholic, conservative cantons (*Appenzell-Innerrhode*, *Appenzell-Outerrhode*, *Uri*, *Schwyz*, *Obwalden* and *Nidwalden*) and those with Radical-liberal governments, there were also violent conflicts between the two groups in *Fribourg*, *Lucerne*, *Valais* and *Zug* (Vatter, 2002). The cultural conflict of the 1870s between the Catholic church and the state involved the educational responsibilities and privileges of the Catholic church.

exception.

The social changes following industrialization added a new dimension to the existing conflict. As in many other European countries, industrialization saw the rise of a sizeable working class, especially in the large urban centers. Though industrialization in Switzerland occurred early, it was not until the second half of the nineteenth century that workers became politically organized. However, the social-democratic party, which built on earlier voluntary associations (*Grütlivereine*) when it first emerged in 1850, was often excluded from political power (Gruner, 1977; 1978). The workers' candidates were rarely able to secure the majority of votes for a mandate; and even if they did, they never achieved a majority of seats in parliament under the plurality system.

In the contemporary discussion (see Klöti, 1901; Saripolos, 1899), the new electoral system of proportional representation was widely viewed as a means to accommodate these diverging political interests and generate a more stable political environment. The existing plurality system also came under scrutiny because ruling parties manipulated voting registers at a large scale to secure their vulnerable political position.<sup>9</sup> Here, proportional representation suggested a compromise in the acrimonious battle between the political opponents.

In the early adopting cantons, the problems associated with the opposition of two, equally strong parties were an important motor for electoral reform. The first adopters of proportional representation nicely illustrate this point. In *Ticino* (1891), plurality rule and fixed voting districts produced a more and more unequal distribution of seats, which led to violent

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<sup>9</sup>For example, it was common practice not to count out-of-canton migrants as part of a canton's population, which lowered the number of representatives in expanding districts. Unlike present debates about plurality systems, gerrymandering, i.e. the manipulation of district boundaries by politicians was not an issue in the Swiss cantons at the time. The reason is that voting districts are tied to historical political units, especially communities and county boundaries (*Bezirke* or *Kreise*). Furthermore, number and boundaries of voting districts are typically fixed in the canton constitutions which require any changes to be approved by the electorate in a referendum.

clashes. The conflict escalated to the point where the federal government intervened and mandated proportional representation. In *Geneva* (1892), changing majorities in each of the three districts generated unstable electoral outcomes which again resulted in violent clashes. In *Neuchatel* (1895), plurality rule failed to generate a winning candidate even after multiple voting cycles.

Industrialization and the rise of left-wing parties played an important role in many cantons adopting between 1900 and 1945, especially in the large, urban centers like *Basle City*, *Zurich* or *Lucerne*. Here, electoral reform was often pushed on the political agenda by a coalition of new left-wing parties and existing minority parties, which hoped to improve their political position. However, it might have been the specific balance of power among established parties rather than the mere political threat posed by left-wing parties that favored electoral reform in the early twentieth century (Lutz and Zila, 2007). After 1950, proportional representation was typically introduced when cantons abolished their communal meetings (*Landsgemeinden*) in favor of more representative forms of government.

Figure 1 provides a graphic representation of the spread of proportional representation across Switzerland. Many cantons that switched prior to 1919 (when proportional representation was adopted for federal elections) are located in the East (lighter shade), but so are the two cantons that still rely exclusively on plurality rule (dark color).

The historical discussion of the spread of proportional representation in Swiss cantons suggests that we need to control for the importance of industrialization and the religious and potentially linguistic fragmentation of the population in our empirical analysis.

### 3.3 Political Consequences

The adoption of proportional representation immediately transformed canton parliaments. Parties dominant under plurality rule typically experienced a decline in their number of seats in parliament in most cantons.<sup>10</sup> For example, the seat share of the Radicals in *Solothurn* dropped from 85 percent to 62 percent in the first election under proportional rule in 1895.<sup>11</sup> Instead, the number of parties with seats in the legislature increased from on average 3.5 parties under plurality rule to 4.3 parties in the new proportional system. This development was in part driven by the founding of new parties after electoral reform, for example, as existing parties split into several factions or previously unorganized groups founded a new political party.

A second important change was that previously excluded or underrepresented groups now gained access to the legislature in proportion to their popular support. Specifically, left-wing parties increased their political weight in many canton parliaments. On average, their share of seats rose from 7.1 percent under the old system to 19.7 percent under proportional system (t-statistic: 17.4). There are however large differences across cantons: while left-wing seats quadrupled in *Basle City* (from 7 percent to 28 percent) and other large urban centers like *Zurich* or *Lucerne*, they did not play an important role in rural cantons like *Nidwalden*, *Zug* or *Valais*.

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<sup>10</sup>In most cantons, the number of seats for each party is calculated according to the Hagenbach-Bischoff method. Hereby, the total number of valid votes are divided by the number of seats plus one in a given district and rounded to the next whole number. The party votes are then divided by this number to calculate the mandates for each party. If not all mandates are allocated in this first step, the second step divides the party votes by the number of allocated mandates plus one. The party with the largest ratio is then given another mandate. Compared to the older ratio method, Hagenbach-Bischoff allocates more seats to large parties.

<sup>11</sup>An alternative way to assess the change in political representation with the adoption of proportional representation would be to calculate the proportionality between number of votes and seats in the legislature (see, for example, Besley and Preston, 2007; Coate and Knight, 2007). However, data on vote shares of parties in canton parliaments are only available after the switch to proportional representation.

Below, we will try to separate the direct electoral effects of the switch to proportional representation from the indirect effects of the documented compositional changes in canton parliaments. We now describe in more detail the data we use for our analysis.

## 4 Data and Empirical Strategy

### 4.1 Data

To test our predictions, we assembled a new historical data set for all cantons in Switzerland between 1890 and 2000. For each canton, we have rich information on government expenditures and revenues, the electoral system and socio-demographic characteristics. The data are compiled from several sources, especially the Swiss Census, the *Historical Statistics of Switzerland* (Ritzmann-Blickenstorfer, 1996) and multiple volumes of the *Statistical Yearbook of Switzerland*. A detailed description of the data sources and construction of variables is provided in Appendix A and a separate web appendix is available from the authors. Table 2 shows summary statistics of all variables used in the empirical analysis.

To characterize the electoral system, we extracted information on the electoral rule and other political institutions from the past and current canton constitutions and all relevant electoral laws. We complemented and cross-checked this information with both canton archives (personal communication) as well as several secondary sources (Lutz and Strohmam, 1998; Klöti, 1901; Schoop, 1987; Société d'histoire et d'archéologie du canton de Neuchâtel, 1989; Wicki, 2006). The institutional measure for the electoral rule in canton parliaments is a binary indicator, which takes a value of one if a canton has a proportional or mixed proportional rule, and zero in case of plurality rule. When a canton switches from plurality rule to proportional representation, the indicator is zero until the first election took place under

the new rule. It is one in the year of the first election under proportional representation and all years thereafter.<sup>12</sup>

Our main outcome variables are the log of total canton expenditures and revenues per capita in a given year. Both are available annually over the whole sample period. To analyze whether proportional representation increases the provision of spending for large segments of the population, we collected information on expenditures for education and welfare. The former covers the provision of secondary education which is the sole responsibility of the cantons. The latter includes both social assistance to the poor and social security payments. Consequently, our measure of welfare spending contains strong elements of insurance against poverty and provisions for old age which benefit a large share of the population. Data for education expenditures exist since 1890, while data for welfare expenditures are available since 1930.

To test whether spending in plurality systems is targeted toward geographically concentrated constituencies, we also compiled data on expenditures for roads and subsidies to agriculture. While spending on canton roads can be easily targeted geographically, agricultural activities are highly concentrated in specific areas. Agricultural subsidies are available since 1930 and expenditures for roads since 1925. Education and welfare expenditures are measured per capita, while expenditures for roads and agricultural subsidies are expressed per 1,000 inhabitants. All expenditure and revenue variables are deflated to Swiss Francs at 2000 prices. Information on the electoral rule is only available in election years while expenditures and revenues are recorded annually. For non-election years, we therefore assigned the electoral rule used in the last parliamentary election. The resulting annual panel allows us

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<sup>12</sup>Since cantons using proportional rule also have a larger voting districts, our estimates should be interpreted as the combined effect of electoral rule and district magnitude.

to evaluate the combined effect of the electoral system on government spending in election and non-election years.

To control for social, demographic and economic factors, we complement our data set with a rich set of controls for each canton. We collected information on the age structure of the population, population size and the share of urban population calculated as the percentage of people living in cities above 10,000 inhabitants. We have information on the importance of industrialization in a canton calculated as the percentage of the workforce that is employed in the industrial sector. Finally, we measure population heterogeneity through separate Herfindahl indices for three religions (Protestant, Catholic and Jewish) and three linguistic groups (French, Italian and German-speaking). Our fragmentation measure, calculated as one minus the Herfindahl index, is closer to zero if the groups are equal in size and approaches one as one group becomes very large relative to the two others.<sup>13</sup> Table 2 shows that both religious and linguistic heterogeneity can be substantial ranging from zero to 0.76 and 0.87 respectively. To check the robustness of our results, we also assembled a variety of measures of other political institutions like the size of parliament, the electoral cycle, women's suffrage, whether the president of the executive is directly elected and different direct democratic participation rights.

One control variable that is not available in our data set is canton income (or wages), which are not available prior to 1965 (1948). We use several variables to control for differences in wealth in our empirical analysis. Specifically, we use the percentage of the population owning a car, the number of doctors per capita and the infant mortality rate to control for income differences. These three variables alone account for 43 percent of the variation

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<sup>13</sup>For example, if the shares of the three groups are 0.3, 0.3 and 0.4, then the Herfindahl index is 0.66 and our measure of fragmentation 0.34. If their shares are 0.1, 0.1 and 0.8 instead, the Herfindahl index is 0.34 and the measure of fragmentation 0.66.

in canton income since 1965, which is astonishing given that declines in infant mortality rates typically occurred much earlier in the century. Once we include our other control variables, for example the size of the agricultural and industrial sector, the age structure of the population and the share of the urban population as well as canton and year fixed effects, we can account for 93 percent of the variation in canton income. Hence, we believe that the absence of a precise measure of canton income is not a major limitation of our study.

## 4.2 Empirical Strategy

Exploiting the rich geographical and temporal variation in the adoption of proportional representation across Swiss cantons after 1890, we use a difference-in-difference approach to estimate its effect on public spending. More specifically, for canton  $c$  in year  $t$ , we estimate models of the form:

$$Y_{ct} = \alpha_c + \gamma_t + \beta Prop_{ct} + \delta' X_{ct} + u_{ct} \quad (1)$$

where  $Y_{ct}$  denotes the log of annual expenditures in a specific policy area. The variable  $Prop_{ct}$  represents our binary indicator if the electoral rule is proportional. The parameter of interest in this specification is  $\beta$ .

Our specifications also include canton ( $\alpha_c$ ) and year ( $\gamma_t$ ) fixed effects. Year fixed effects absorb common shocks like the two World Wars or economic depression. Canton fixed effects are important since there are strong, persistent differences between German-speaking and French- or Italian-speaking cantons. For example, our study of the canton constitutions revealed that some cantons allow their citizens to recall the government, while others do not. These institutional differences are highly persistent over time and we would expect them to influence politicians' behavior.

Since Swiss cantons might differ along other dimensions which influence government spending decisions, we also include a number of time-varying controls  $X_{ct}$  in our baseline specifications. In particular, we include the age structure of the population and the size of the urban population to control for differences in the demand for government. The population size is included to allow for economies of scale in the provision of public services. We add the log of federal subsidies to adjust for differences in the resources available to cantons and also include our three proxies for canton income (car ownership, doctors per capita and the infant mortality rate). Finally, we control for two factors that were important motors for electoral reform: the size of the second sector and measures of population heterogeneity. Since these variables control for two important factors driving the decision to adopt proportional representation, their inclusion in the regression reduces any potential bias from endogeneity.<sup>14</sup>

In this econometric framework, only the timing of adopting proportional representation is assumed to be exogenous. Fixed differences across states, common shocks and other factors varying non-linearly over time are all purged from the estimate of  $\beta$ . Only changes in spending that coincide precisely with the timing of proportional representation are captured by this parameter. The validity of our identifying assumption is explored in detail in section 5.4 and corroborated by evidence using exogenous variation at the local level in section 6.

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<sup>14</sup>One concern might be that proportional representation affects population heterogeneity through selective migration. In that case, our specification would capture only the effect of proportional representation net of its impact on population heterogeneity. However, we do not find any evidence that proportional representation affected population heterogeneity or internal migration in the decades after adoption. See also section 5.4 below.

## 5 Canton-level Results

### 5.1 Provision of Broad Services and Targeted Transfers

This and the next section provide direct evidence on how public spending changed with the adoption of the proportional rule. Section 5.3 shows whether the results are driven by direct electoral incentives or rather compositional changes in the legislature following adoption. The final section investigates the robustness of our results.

Since the winning coalition, i.e. the number of votes to win an election, is larger in a proportional system, support-maximizing politicians should shift to broad spending after electoral reform. To measure the importance of expenditures that benefit large segments of the population, we use spending on education, which is largely publicly provided in Switzerland, and welfare, which includes both social security expenditures and assistance to the poor.

The left-hand side of table 3 shows the results. The first specification in each expenditure category (odd columns) includes the binary indicator of the electoral system, our set of canton controls and year fixed effects. The second specification (even columns) also includes canton fixed effects to eliminate unobservable differences across cantons that are constant over time. The results strongly confirm the prediction that spending in proportional systems shifts to categories that benefit broad constituencies: cantons adopting proportional representation spend 10 percent more on education and 33 percent more on welfare.

The control variables have largely the expected sign. More subsidies from the federal level have a positive effect on spending for broad programs like education and welfare. Urbanization is associated with more welfare spending but also less education spending. The latter possibly reflects economies of scale in the provision of schools in densely populated

areas. The coefficient on log population is strongly negative in the fixed effects specification for education suggesting that there are substantial economies of scale in the supply of education.

Models of electoral systems also predict that politicians elected under majority rule target political support from groups that can win a majority in highly contested districts. Consequently, we expect spending on narrow and geographically concentrated groups to decline after the adoption of proportional representation. To test this prediction, we use expenditures for roads and agricultural subsidies since both can be targeted geographically. The control variables are the same as before. The right-hand side of table 3 shows that expenditures for roads are 53 percent lower while agricultural subsidies are 28 percent lower if parliaments are elected under proportional rule.<sup>15</sup>

In sum, our estimates show that the adoption of proportional rule shifted the scope of public spending away from transfers toward spending for broad social groups. All coefficients for the proportional rule are highly statistically significant at the one percent level. Our results corroborate previous findings from cross-country data showing that countries with a proportional system have more broad-based spending and higher social spending than countries with a plurality system (Milesi-Ferretti, Perotti and Rostagno, 2002; Persson and Tabellini, 2003; 2004).

While the estimated coefficients seem large, the effects we find for social spending are actually substantially smaller than those based on cross-country evidence. For example, Persson and Tabellini (2003) report that social security and welfare spending (measured relative to GDP per capita) are 2 to 3 percent higher in countries with proportional system.

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<sup>15</sup>Note that the fixed effects results for welfare and agricultural subsidies (where expenditure data is available from 1930 to 2000) are identified from the six cantons switching to proportional representation after 1930. However, the results are qualitatively very similar to those without fixed effects.

Our estimate of 33 percent higher welfare spending in cantons with proportional rule is equivalent to 1 percent more spending on welfare plus social security in terms of GDP per capita in 2000. The next section explores how proportional representation affects the overall size of government.

## 5.2 Size of Government

As discussed above, the effect of adopting the proportional rule on the overall size of government is theoretically ambiguous. We estimate the same model in (1) where the dependent variable is now the log of total expenditures or total revenues per capita. As before, the first specification includes year fixed effects and canton socio-economic characteristics, while the second specification also includes canton fixed effects.

The results are reported in table 4. Column (1) shows that cantons switching to proportional representation have 4 percent higher expenditures than cantons with a majority rule in place. The same pattern emerges on the revenue side where cantons with proportional rule have 2.8 percent higher expenditures even though the coefficient is not statistically significant. The second specification adds canton fixed effects. Absorbing all time-invariant unobservable differences across cantons, we find that adopting proportional representation is not associated with any change in expenditures.<sup>16</sup> However, adopting the proportional rule for electing parliament does lower government revenues by 2.8 percent though the coefficient is only statistically significant at the 10 percent level. The fact that politicians in a proportional system do not spend more but at the same time have less revenues available suggests that parliaments elected under the proportional rule are somewhat more likely to

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<sup>16</sup>Taagepera and Shugart (1989) have argued that election result under proportional rule with very small district magnitudes ( $\frac{\text{seats}}{\text{districts}} \leq 6$ ) yield seat shares close to those obtained under plurality rule. In our data however, most canton-year observations (85 percent) for which we have data have district magnitudes of 6 or higher under proportional representation.

run deficits than canton parliament elected under plurality rule.

The control variables in both the expenditure and revenue regressions have largely the expected signs. Federal subsidies, an important source of revenues, are again associated with higher spending. Population size (in logs) lowers expenditures suggesting important economies of scale. In line with other studies (for example, Alesina, Baqir and Easterly, 1999), we find that a more fragmented population with respect to language spoken or religious beliefs lowers public spending and revenues in the fixed effects specifications (columns (2) and (4) of table 4).

Our results on total spending differ from most of the previous findings based on cross-country data: Persson and Tabellini (2003; 2004) and Milesi-Ferretti, Perotti and Rostagno (2002) report positive results for their sample of OECD countries while Aidt et al. (2005) find negative results for Western Europe. One major advantage of our data is that we can exploit temporal and spatial variation in adoption patterns within the same country for estimation. In contrast, existing studies compare expenditures between very different electoral systems and many decades after proportional rule has been adopted in a country.

### **5.3 Mechanism**

Above, we identified three channels of how the proportional rule affects the size of government: first, proportional rule results in a more fragmented legislature, which is associated with more spending. Second, the adoption of proportional representation in the late nineteenth and early twentieth century increased political representation of left-wing parties. Contemporaneous studies suggest that left-wing parties support larger governments. Conditional on these compositional changes, support-maximizing politicians will promote more or less spending depending on the distribution of preferences and the nature of electoral

competition under the two electoral systems.

This section provides evidence about the relative importance of each of the three factors for government spending. We first examine more systematically how proportional rule changed representation in the legislature. More specifically, we estimate regressions where the dependent variable is a measure of political fragmentation or the political strength of left-wing parties and the main independent variable is again proportional representation. We also include in our regressions controls for population heterogeneity, the share of urbanization and population size measured in logs.

We measure party fragmentation in two ways: by simply counting the number of parties with seats in the legislature; alternatively, we calculate a fragmentation measure calculated as one minus the Herfindahl index of concentration. The index varies from zero to one with larger values indicating a more fragmented party structure. We have the seat distribution for six individual parties while the remaining parties are collapsed into a single category ('other') which will underestimate the actual degree of fragmentation. Our measure for the strength of left-wing parties is calculated as the share of seats held by the Social Democrats. Estimates based on all left-wing parties, which includes seats held by the Communist party, are very similar and not reported here.

The results are presented in table 5. Odd columns report results with year fixed effects for each dependent variable, while even columns also add canton fixed effects. Across both specifications, we find that proportional rule has strong effects on the composition of parliament: it increases the number of parties, political fragmentation and left-wing representation. Specifically, proportional representation increases the number of parties by 0.6 or about 6/10 of a standard deviation. The effect on party fragmentation is with 0.14 or more than one standard deviation even stronger. Finally left-wing parties increase their share of

seats by 6 percent or  $1/2$  of a standard deviation. This latter effect was likely the result of the specific historical context in Switzerland and other Western European countries at the time.

In a second step, we then reestimate regressions for government expenditures where we now also control for party fragmentation and share of left-wing parties. The coefficient on the indicator for proportional representation then identifies the relationship between electoral incentives for politicians and overall spending net of any compositional changes in the legislature. Results are shown in table 6. The first column reruns the baseline from table 3 for the subsample of years and cantons for which we have valid party information. The coefficient is not statistically significant and very similar to the one estimated on the full sample. Subsequent columns add sequentially the number of parties (column (2)), party fragmentation (column (3)) and the share of left-wing parties (column (4)) to our variable for the electoral rule. The final column adds all three measures simultaneously.

The results clearly indicate that left-wing parties and party fragmentation (though not the raw number of parties) increase spending. To assess their relative magnitude, we calculate the effect of a one standard deviation in each measure based on the estimates in column (5). Accordingly, left-wing parties raise spending by 5.7 percent ( $0.109 \times 0.526$ ) while party fragmentation contributes another 3.6 percent ( $0.117 \times 0.301$ ). Conditional on compositional changes in the legislature, the direct effect of the proportional rule is to lower spending by 6.5 percent. The fact that overall spending is lower once we condition on compositional changes is consistent with barriers to entry limiting the electoral competition in a plurality system. An alternative interpretation is that the median voter in Switzerland valued spending for education and welfare, which rose under proportional rule, relatively little and spending on targeted subsidies relatively more. While we cannot distinguish between these

interpretations, we think that uncovering this negative relationship is an important first step in isolating the incentive effects of proportional representation.

## 5.4 Robustness Analysis

An important concern with our empirical strategy is that the adoption of proportional representation is possibly endogenous or occurred simultaneously with other political events that also affected public spending. In addition, public spending is typically very persistent which creates concerns of serial correlation (see Bertrand et al., 2004). This section presents a number of informal validity tests and robustness checks to investigate these concerns.

First, one might worry about the dynamics in our data. In particular, it is likely that there are persistent shocks to spending (for example, an economic depression or the two World Wars). These shocks will bias our results because they might affect the decision to adopt proportional representation directly or affect one of our other controls that is correlated with the electoral system. In that case, one should estimate a dynamic panel relationship by including, for example, the lagged dependent variable as an additional control. It is well known that a dynamic panel specification with fixed effects can lead to a large estimation bias. However, in our case the bias is likely to be small because the number of time periods ( $T=110$  years) is large relative to the number of cross-sectional units ( $N=25$  cantons). Hence, our first specification in table A1 includes the log of lagged spending as an additional control. The results are qualitatively the same though the coefficients on the different expenditure categories are smaller.

An alternative way to control for the persistence in public spending is to estimate equation (1) in first differences. Row (2) reports the results. Like many other studies, we find that the first difference results are much weaker. However, the results are again qualitatively similar,

though no longer statistically significant for education and road spending. If spending is highly persistent, the standard errors might also be severely downward biased (see Bertrand et al., 2004). In view of our relative small number of cantons, we implement the before-after estimator which regresses spending net of all control variables on the dummy for proportional representation for the cantons that adopted the new electoral system. The estimates reported in row (3) are again qualitatively similar to the baseline.

Another concern might be that it is the general demand for democratization, rather than the adoption of proportional representation, that drives our results on public spending. To control for these changes, we include the number of years since the executive was directly elected by the citizens and direct democratic participation rights, in particular the law referendum, budget referendum and the signature requirement for the voter initiative (row (4)). An important extension in voting rights over our sample period was women's suffrage. We add a dummy variable equal to one if suffrage was adopted in a canton in a given year and zero otherwise in row (5). The results for both specifications are very similar to the baseline. Alternatively, there might be other changes in social values that were in favor of proportional representation and changed the demand for government. Row (6) therefore includes the share of divorcees and the share of protestants to the equation, which does not affect our results.

Our results might also be affected by other political changes that occur at the same time as the switch to proportional representation. Hence, row (7) adds the size of the legislature and executive as well as the electoral cycle.<sup>17</sup> Both have little effects on the estimates except in one case where the coefficient becomes statistically insignificant. Since figure 1 suggests

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<sup>17</sup>We do not analyze the role of an independent executive (directly elected by citizens rather than appointed by parliament) here since there is hardly any variation over time.

some geographic patterns of adoption, row (8) reports estimates obtained by including region-specific time trends. The results remain unchanged. We also assess the robustness of our results to alternative specifications of the spending and electoral variables. Row (9) restricts the sample to election years which again does not alter our conclusions. We also checked whether our results change if we exclude cantons with a mixed proportional system (row 10).<sup>18</sup> The last specification uses the level of expenditures as the dependent variable. For all expenditure categories, we find the same pattern as for the log specification.

Second, we test whether the adoption of proportional representation were related to initial conditions in 1890 (population, age structure, employment, population heterogeneity, wealth) and the timing of other major political changes (adoption of direct democratic instruments like referendum and initiative, year since executive is directly elected and founding year of the Social Democratic Party). Table A2 shows few discernable relationships between political changes or socio-economic characteristics and the timing of electoral reform. Religious heterogeneity is associated with an earlier adoption which is expected given that the divide between Protestants and Catholics was a driving force for adoption (see section 3.2). Since we control for direct democracy and religious (and linguistic) heterogeneity, these correlations should not affect our results.

Finally, it could be the case that selective migration into cantons with proportional representation changes the composition of the electorate and possibly the demand for government services. In particular, we might expect that groups that were underrepresented under the

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<sup>18</sup>Electoral systems also differ along other dimensions: whether voters can accumulate votes, choose individual candidates on a list or whole party lists, and voting thresholds; the latter limit party fragmentation in the legislature. Using information in 1987 and 1998, we find that the accumulation of votes or open lists is not associated with less spending. Using annual data on (explicit and implicit) voting thresholds from 1983 to 2000, we find that spending is decreasing with voting thresholds in proportional systems, but not so in majority systems. The constraining effect of voting thresholds is consistent with our result that a more fragmented legislature leads to more spending. Results are available upon request.

old system (for example, the working class) move to cantons where they had political influence through proportional representation.<sup>19</sup> To test the importance of selective migration, we coded the share of people born in the same canton as their current residence using census data from 1888 to 2000. We then run a regression with this share as the dependent variable on the years since proportional representation was adopted in that canton and additional controls. If selective outmigration is important, the coefficient on the years since adoption would be negative. Table A3 shows the results for several time periods as well as with and without canton fixed effects. The results are not statistically significant except for one case where the coefficient is actually positive, not negative. If anything, there is less outmigration from cantons that adopted proportional representation earlier. Selective outmigration cannot therefore explain our results on the scope and size of government. With a few exceptions, the paper’s main findings are robust across these alternative specifications.

## 6 Evidence from Local Governments

A remaining concern with our empirical strategy is that omitted time-varying unobservables might affect both public spending and the decision to adopt proportional representation in a canton. In this section, we make use of exogenous variation in electoral systems across Swiss communities to corroborate our findings at the canton level.

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<sup>19</sup>Ideally, we would like to analyze detailed migration flows in and out of cantons adopting proportional representation. Unfortunately, we only have information on the total migratory gain (including international migration) in census years available to us. We do however not find that the net migratory flow changes increases or decreases significantly with proportional representation.

## 6.1 Electoral Systems and Data at the Local Level

The typical community in Switzerland has two levels of local government: the executive and legislative. The executive (often called *Gemeinde-* or *Stadtrat*) is the most important political body. It has on average six members and is directly elected from the electorate.<sup>20</sup> In contrast, only about 20 percent of communities have a parliament as their legislative body; the remaining ones rely on community meetings of its citizens instead. Hence, we will study both the legislative and the executive since the effects of the electoral system on policy choices should be qualitatively similar irrespective of the political body (see for example, Persson and Tabellini, 2000; 2004).<sup>21</sup>

We use two empirical strategies to determine whether the electoral system affects local spending. First, several cantons mandate the electoral rule for elections at the local level. Since electoral systems are determined at the canton level, they can be plausibly considered exogenous from the perspective of the individual community. We compare the size of government in communities located in cantons mandating proportional representation to communities in cantons with mandatory plurality system.

Our second empirical strategy uses data on communities that can choose their electoral system. We compare the size of government between communities with different electoral rules conditional on a number of observable characteristics using a matching estimator. Since this approach compares communities located within the same canton, we can also control for all unobservable differences across cantons.

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<sup>20</sup>The only exception are communities in the canton of *Neuchatel*, where the executive is elected by local parliaments.

<sup>21</sup>We include information on the executive in our analysis for two reasons: first, communities with an elected parliament are a selected sample. Second, information on the electoral rule is available in 1988, 1998 and 2005 for the executive but only in 1988 for the legislative. While we contacted all communities with a parliament by email to request additional information on their electoral rule since 1988, the response rate was only about 30 percent.

For our analysis, we use comprehensive information from the roughly 3,000 communities in Switzerland collected by Professor Ladner from the University of Berne.<sup>22</sup> The data come from a written survey sent to the leading administrator of all communities in Switzerland at four different points in time (1988, 1994, 1998 and 2005). The survey elicited information on the activities and political structure of local government and had response rates of over 75 percent.

The surveys do not contain detailed information on actual spending. We hence take the number of administrative personnel per capita in the community as our measure of local public spending. We think administrative spending captures genuine differences in the size of government because the provision of public goods and services require a bureaucracy for administration. In addition, wasteful spending or rents for local politicians are often associated with more bureaucracy. Finally, administrative expenditures are very highly correlated (0.8) with the overall size of government at the canton level.

We code mandates from canton constitutions and community laws that regulate local affairs and information in Ladner (1991). Our main measures are binary indicators equal to one if a canton requires a proportional rule and zero if majority rule is mandated separately for the executive and legislative.<sup>23</sup> Since there is little change in electoral rules or mandates over time, all our estimates rely on variation across communities for identification.

To adjust for other social and demographic heterogeneity across communities, we match data from the 1980, 1990 and 2000 Swiss census. The Census provides information on the size of the community, its age structure, the employment rate, the fraction employed in

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<sup>22</sup>We are very grateful to Professor Ladner for making the data available to us. Details of the survey, questionnaires and data are available at <http://www.andreasladner.ch/gemeindeforschung/>. An in-depth description of the data can be found in Ladner (1991) and Ladner et al. (2000).

<sup>23</sup>Between 1988 and 2005, only two cantons abolished their mandate for majority rule over the sample period (*Appenzell-Innerrhode* in 1996 and *Lucerne* in 2004). Hence, our binary indicator whether a canton imposes a mandate is therefore coded as one before the change and zero thereafter for the two cantons.

agriculture or industry, the share of protestants and whether the community is located in the Alps. We used linear interpolation to create annual observations and then kept the observations from the survey years for the estimation. Table 7 contains summary statistics of the local data.

## 6.2 Results from Mandates and Matching

Our first empirical test exploits mandates of the electoral rule that are imposed by the canton. In particular, we compare the size of the local administration in communities with mandated proportional rule to communities with mandated plurality rule. In Switzerland, sixteen cantons mandate plurality rule for the executive, while two cantons mandate proportional representation. A similar analysis is not possible for the legislative since all mandates impose proportional rule but none plurality rule.

Since these mandates are imposed at the canton level, they are exogenous from the perspective of the individual community. Furthermore, the mandates were imposed a long time ago and do very rarely change over time. *Ticino* and *Zug*, for example, imposed proportional rule for the local level back in 1891 and 1894 respectively. Hence, mandates imposed at the canton level are not the result of current local public finances or conditions correlated with local public finances.

We estimate a regression model similar to (1) where the dependent variable is the log of administrative personnel per capita in a community.<sup>24</sup> To control for observable differences, we include in all specifications year dummies, the fraction of children under 15, detailed con-

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<sup>24</sup>We choose the log specification in order to be consistent with the canton level estimates. In the raw data, the number of administrators per 100 inhabitants is zero for about 5 percent of the sample (N=431). These seem to be true zeros only for a minority of the cases where the community is smaller than 200 inhabitants. They are most likely missing values for the other, larger communities. We therefore did not use the communities with reported zero in the estimation. When we reestimate the same relationships in levels, we find qualitatively similar results.

trols for population size, the share of protestants, the fraction of nonemployed and employees in agriculture or mining, the dominant language of the canton and whether the community is located in the Alps. Standard errors are clustered at the canton level.

As a benchmark, we first estimate this regression for communities in the eight cantons that can choose their electoral rule (*Berne, Fribourg, Solothurn, Basle County, Grisons, Thurgau, Valais* and *Jura*). The results are shown in table 8. Column (1) uses the electoral rule for the legislative and column (2) for the executive as the main independent variable of interest. For both political bodies, we find no statistically significant correlation between the electoral rule and the size of the local administration. This result confirms our intuition that the electoral rule should have similar effects irrespective of the political body (legislative, executive). Furthermore, the estimates are consistent with our result for the size of government at the canton level.

We then estimate the same regression for the sample of communities with mandated electoral rule for the executive. Basically, we compare spending in communities with exogenously imposed proportional rule to those with a mandated plurality conditional on other observables. The main independent variable is a binary indicator equal to one if the community has mandated proportional rule to elect its executive and zero if plurality rule is mandated. Column (3) shows that communities with mandated proportional rule do not have more local administration than communities with mandated plurality rule.<sup>25</sup>

Cantons that mandate proportional rule might however differ from others that mandate plurality rule along some unobservable dimension. While the communities in the two types of cantons are similar along socio-demographic characteristics (for example, population size

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<sup>25</sup>The results in table 8 remain unchanged if we add the presence of a local parliament or additional demographic variables to the specification. The estimates are also robust to excluding cantons which abolished their mandates or cities with more than 30,000 inhabitants, which tend to have more than one voting district. Results are available upon request.

or employment), they differ along some political dimensions (for example, the size of the executive or whether the community has a parliament).

As a second empirical test, we hence use the sample of communities that can choose their electoral rule. We use propensity score matching to compare the size of local administration between communities which differ in their electoral rules but have otherwise similar observable characteristics. In a first step, we estimate a logit model of the determinants of choosing proportional representation. The independent variables are the same as those used in the regressions above. Since we now add canton fixed effects, we match communities within the same canton and hence, eliminate any unobservable differences between cantons. The results of the logit model and the treatment on the treated effects which impose common support of the propensity score are shown in table 9.<sup>26</sup> For both the legislative (column (1)) and executive (column (2)), table 9 shows no statistically significant differences in the size of local administration for communities with proportional rule.

In sum, the results using mandates and matching methods at the local level confirm our findings at the canton level: using proportional representation to elect parliaments or executives does not generate more public spending.

## 7 Conclusion

Using variation in the adoption of proportional representation across cantons in Switzerland, this article demonstrates that electoral systems have important implications for fiscal policy.

Under proportional rule, politicians required the support of broader segments of the popu-

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<sup>26</sup>We implemented the matching estimator using both nearest neighbor and kernel matching (biweight kernel) to construct a control group of communities with similar values of the estimated propensity score. The identifying assumption is that conditional on the observables, there is no unobserved heterogeneity between communities located in the same canton choosing different electoral rules. Figure A1 shows substantial overlap in the support of the propensity score for the treated and untreated communities.

lation. Accordingly, public spending shifted away from targeted subsidies to narrow groups and encouraged spending on broad services like education and welfare benefits.

Our findings do however not support concerns that proportional rule results in larger governments. Across a variety of methods and levels of government, we find little evidence that proportional representation increases overall spending. It is only compositional changes in the legislature, in particular a more fragmented and left-wing legislature that generates more spending in proportional systems. Conditional on these compositional changes, proportional systems actually seem to shift electoral incentives in the direction of less spending.

Though pioneering, Swiss cantons were by no means the only political units that adopted the new electoral system. On the contrary, many states in Europe and elsewhere switched to proportional representation after 1890. The first country to adopt it at the national level was Belgium in 1899; Germany followed in 1918, Ireland in 1919 and France in 1945. While Switzerland has, for example, a much stronger direct democratic tradition than other democracies, the effects of proportional representation remain unchanged even conditional on provisions for initiatives and referendums. We therefore believe that our findings provide valuable insights for other countries with proportional representation.

Certain features of the Swiss electoral system might however work against larger governments in a proportional system. Most importantly, voters in Switzerland are able to accumulate votes for a single candidate, which strengthens accountability of politicians. Furthermore, most cantons allow citizens to select individual candidates on a list rather than choose between whole party lists.<sup>27</sup> Since open lists tie the election outcome of individual candidates closer to their performance, this could foster accountability and reduce overspending. An electoral reform that restrict voters to party lists and single, non-transferable votes

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<sup>27</sup>Voters can actually combine candidates from different party lists ('panachage').

might be associated with a larger government. The Swiss case however clearly demonstrates that it is not proportional rule per se that increases public spending. Overall, our article provides room for optimism that better political representation of the population does not necessarily inflate the public sector.

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## A Canton-Level Data

This appendix describes the data sources and construction of variables for the 25 Swiss cantons. We drop the canton Jura in our analysis, which was founded only in 1978. Our main outcome variables for the size of government are canton expenditures and revenues. Both are taken from the annual publication ‘Statistisches Jahrbuch der Schweiz’ for 1890 to 1950 and from ‘Öffentliche Finanzen der Schweiz’ for 1950 to 2000. All expenditure and revenue categories are expressed per capita and deflated to 2000 Swiss Francs using the annual consumer price index reported in Schuppli and Studer (2004). Government expenditures and revenues are interpolated for two years with missing observations (1967 and 1968).

Expenditures for education are available for the years 1890, 1892, 1893, 1895-1898, 1901-1905, 1909, 1910-1912, 1916, 1920, 1928, 1930, 1934, 1938, 1946 and annually since 1950. The information was taken from ‘Statistisches Jahrbuch der Schweiz’ and Hofferbert (1976). To measure transfer payments, we use welfare expenditures which combines social assistance to the poor and social security payments. The data come from ‘Statistisches Jahrbuch der Schweiz’ prior to 1950 and from ‘Öffentliche Finanzen der Schweiz’ after 1950. Welfare spending is available since 1930 (in particular, we have data for the years 1930, 1934, 1938, 1942, 1946 and annually since 1950).

Agricultural subsidies are taken from ‘Historical Statistics of Switzerland’ and available since 1930 (1930, 1934, 1938, 1946). Data after 1950 are taken from ‘Öffentliche Finanzen der Schweiz’ but missing for 1968 to 1974. Expenditures on roads are taken from ‘Historical Statistics of Switzerland’ and available since 1925 (data was available for the years 1925-1927, 1929, 1933, 1936, 1939, 1942, 1944, 1946, 1949, 1952, 1954, 1956, 1958, 1961, 1963-1965, 1967, 1968 and annually since 1970. Missing values are interpolated).

Our measure of electoral system is the year of adopting proportional representation,

which is taken from Lutz and Strohmann (1998). The district magnitude is calculated from the number of voting districts divided by the number of seats in the legislature. Both measures were kindly provided by Georg Lutz from the University of Berne and supplemented with information from the canton constitutions, Klöti (1901) and correspondence with the canton archives (*Staatsarchive*). Information on the availability of open lists, panachage and accumulation of votes is available for two points in time (1987 and 1998) and was collected from Moser (1987), Poledna (1988) and Lutz and Strohmann (1998). Our measure for the voting threshold is available from 1983 to 2000 and comes from Vatter et al. (2004).

The number of parliamentary seats for the major parties is available from the ‘Statistisches Jahrbuch der Schweiz’ since 1930. Additional information was supplemented by historical accounts on individual cantons (Thurgau: Schoop, 1987; Neuchatel: Société, 1989; Basle County: Blum 1980; Aargau: Wicki, 2006; Berne: Junker, 1996; Basle City: Lüthi, 1962), inquiries at the canton archives and data kindly provided by Professor Andreas Ladner. We have data for six parties and a residual category ‘other parties’. We calculate a measure of party fragmentation based on the information in the seven categories as one minus the Herfindahl index. Note that the aggregated category ‘other’ results in an underestimation of the actual number of parties and party fragmentation in the legislature. Party information is available for the following time periods: Aargau (1917-2000), Berne (1922-2000), Basle County (1908-2000), Basle City (1890-2000), Fribourg (1916-2000), Geneva (1892-2000), Glarus (1920-2000), Grisons (1919-2000), Lucerne (1891-2000), Neuchatel (1889-2000), Nidwalden (1943-2000), Obwalden (1966-2000), Saint Gallen (1912), Schaffhouse (1892-2000), Schwyz (1900-2000), Thurgau (1917-2000), Ticino (1923-2000), Uri (1932-2000), Vaud (1933-2000), Valais (1921-2000), Zug (1890-2000) and Zurich (1917-2000).

To adjust for differences in the political system, we also constructed measures of direct democracy and the electoral cycle for each canton. Our first variable for direct democracy is a binary indicator equal to one if a canton has a mandatory budget referendum in place and zero otherwise. The data is taken from Trechsel and Serdült (1999) who systematically collected information for cantons without a town-meeting from 1970 to 1996. For canton with town meetings and the period from 1890 to 1970, we collected data using old canton laws and constitutions supplemented by information from the canton archives (*Staatsarchive*). Our second measure is also a binary indicator equal to one if a canton mandates new laws to be approved by the electorate (mandatory law referendum) and zero otherwise. Finally, we also control for the voter initiative which is today allowed in all cantons. Our measure for the voter initiative is calculated as the signatures required for launching an initiative in percentage of the eligible population. In cantons where the voter initiative was adopted after 1890 (the beginning of our sample period), we set the signature requirement to 15 percent, which is about twice the maximum observed in the data.

Most of our other control variables are taken from the decennial Census as reported in ‘Historical Statistics of Switzerland’, Hofferbert (1976) and ‘Statistisches Jahrbuch der Schweiz’; the data are available for 1888, 1900, 1910, 1920, 1930, 1941, 1950, 1960, 1970, 1980, 1990 and 2000. The population in each canton is taken from ‘Statistisches Jahrbuch der Schweiz’ and available annually since 1888.

Population density is measured as the log of the number of people (in 1,000) and is taken from the decennial Census. Urban population is measured as the percentage of the population living in cities above 10,000 inhabitants. The data is taken from ‘Historical Statistics of Switzerland’ and ‘Statistisches Jahrbuch der Schweiz’ and available for 1890, 1894, 1898, 1903, for each decade between 1910 and 1960 as well as 1962, 1969, 1974, 1979, 1984, 1990 and 2000. The information on the population in different age groups (below 20, between 20 and 64 and above 65), the number of foreigners, percentage born in the same canton and religious affiliation is from the decennial Census. All three variables are expressed as percentage of the total population. Religious affiliation is calculated as the share of the population that is Protestant as opposed to Catholics and other religions.

We also constructed two indices for religious and linguistic fractionalization. Both are based on Herfindahl indices calculated as  $1 - \sum_{i=1}^n s_i^2$  where  $s_i$  are the shares of group  $i$  in the population and  $n$  denotes the total number of (religious or linguistic) groups. The groups considered were Protestants, Catholics and Jews (religious fractionalization) and French, Italian and German (linguistic fractionalization) respectively.

Foreign denotes the percentage of the population that is not a Swiss citizen in a given canton. The importance of divorce is from the decennial Census and calculated as the fraction of the population above 20 that is divorced. We collected several labor market indicators to control for differences in economic activity across cantons. The total number employed and employment in the first (agriculture) and second (manufacturing) sector are from the decennial Census. The distribution across sectors is calculated as percentage of total employment.

To control for income differences across cantons, we use car ownership, calculated as number of cars per population. The data is from ‘Historical Statistics of Switzerland’ and ‘Statistisches Jahrbuch der Schweiz’. The variable is zero before the first cars emerged in 1910 and positive thereafter. Data on cars owned is available for 1914, 1917, 1923, 1929, 1934, 1939, 1945, 1947, 1950, 1954, 1958, 1962, 1966, 1970, 1975, 1978, 1982, 1986 and annually since 1990.

Federal subsidies are revenues for cantons comprised of subsidies by the federal state for roads, education, welfare, agriculture and other areas. They are obtained from ‘Historical Statistics of Switzerland’ prior to 1955 and from ‘Öffentliche Finanzen der Schweiz’ thereafter. The data are available for 1893, annually between 1915 and 1926, 1928, 1930, 1931,

1933, 1935-1937, 1940, 1942, 1943, 1945, 1946, 1949 and annually since 1953, but missing between 1968 and 1977. All missing years were again obtained by linear interpolation.

**Table 1: Electoral Systems of Swiss Cantons in 1998**

	Year PR Adopted	Mixed System	Seats in Parliament
<u>Adopted prior to 1919:</u>			
Ticino (TI)	1891		90
Geneva (GE)	1892		100
Zug (ZG)	1894	X	80
Neuchatel (NE)	1895		115
Solothurn (SO)	1896		144
Schwyz (SZ)	1900	X	100
Basle City (BS)	1905	X	130
Lucerne (LU)	1911		170
St. Gallen (SG)	1912		180
Zurich (ZH)	1917		180
<u>Adopted 1920-1950:</u>			
Basle County (BL)	1920		90
Glarus (GL)	1920		80
Thurgau (TG)	1920		130
Aargau (AG)	1921		200
Fribourg (FR)	1921		130
Valais (VS)	1921		130
Berne (BE)	1922		200
Vaud (VD)	1949/1962		180
<u>Adopted 1950-2000:</u>			
Schaffhouse (SH)	1952	X	80
Nidwalden (NW)	1982		60
Obwalden (OW)	1986		55
Uri (UR)	1992	X	64
<u>Not Adopted:</u>			
Appenzell Outerrhode (AR)	N/A	X	65
Appenzell Innerrhode (AI)	N/A		46
Grisons (GR)	N/A		120

*Notes:* The table shows the main institutions of each canton's electoral system and its evolution over time. The first column shows the first year the canton parliament was elected under the new proportional rule. *Vaud* had a mixed electoral system between 1949 and 1962 before adopting a pure proportional system in 1962. *Appenzell-Outerrhode* allows its districts to adopt proportional representation since 1997 but only one (Herisau) out of six has chosen to do so. *Appenzell-Innerrhode* and *Grisons* still have a majoritarian system in place.

*Source:* Lutz and Strohmann (1998)

**Table 2: Summary Statistics of Canton-Level Data, 1890-2000**

	Observations	Mean	Std. Dev	Min	Max
<b><u>Electoral and Party System</u></b>					
Electoral Rule (1= Proportional/Mixed)	2775	0.62	0.49	0	1
% Social Democratic Party	2038	17.74	10.99	0	48.46
Number of Parties	2038	4.47	1.06	2	7
Party Fragmentation Index	2038	0.65	0.12	0.23	0.82
<b><u>Fiscal Policy Variables (log per capita)</u></b>					
Expenditures	2775	7.16	1.26	4.42	9.85
Revenues	2775	7.14	1.27	4.52	9.91
Education	2775	5.25	1.57	0.82	8.44
Welfare	1775	5.60	1.03	1.07	8.16
Roads (per 1,000 inhabitants)	1900	5.59	1.11	0.05	9.30
Agriculture (per 1,000 inhabitants)	1775	4.80	1.18	0.41	7.55
Federal Subsidies (per 1,000 inhabitants)	2700	5.34	1.17	2.32	8.74
<b><u>Control Variables</u></b>					
Age 0 to 19 (in %)	2775	33.79	6.79	15.71	45.78
Age 20 to 39 (in %)	2775	29.98	2.55	23.14	39.21
Age 40 to 64 (in %)	2775	26.79	3.47	17.84	36.48
Age 65 and older (in %)	2775	9.44	3.56	3.75	21.03
Population (log)	2775	11.64	1.10	9.45	14.02
Urban Population (in %)	2775	25.62	25.58	0	100
Employed in Agriculture (in %)	2775	20.28	13.89	0.22	74.37
Employed in Manufacturing (in %)	2775	43.56	11.34	13.80	71.46
Car Ownership (in %)	2775	12.27	16.69	0	59.20
Doctors per capita (per 1,000)	2775	0.89	0.48	0.05	3.76
Infant Mortality Rate (per 100,000 births)	2774	60.28	100.45	0.00	960.33
Linguistic Fractionalization Index	2754	0.21	0.17	0	0.76
Religious Fractionalization Index	2770	0.35	0.18	0	0.87
Foreigners (in %)	2775	11.34	7.71	1.52	40.66
Protestants (in %)	2775	0.40	0.29	0.01	1.00
Divorced (in %)	2775	2.05	1.92	0	9.64
Mandatory Budget Referendum	2775	0.62	0.49	0	1
Signature Requirement Initiative	2775	2.43	1.82	0.003	8.5
Law Referendum	2746	0.62	0.49	0	1
Size of Parliament	2483	119.55	49.75	32	257
President of Executive Directly Elected?	2775	0.24	0.43	0	1
Electoral Cycle (in years)	2032	3.83	0.67	2	6

*Notes:* The unit of observation is a canton-year pair. Spending and revenues are deflated to 2000 Swiss Francs. Expenditures for agriculture and roads as well as federal subsidies are per 1,000 inhabitants, all other expenditure and revenue categories are per capita. Total expenditures, revenues and education spending are available for 1890-2000, road expenditures since 1925, welfare and agricultural spending since 1930. Urban population reflects the share living in cities above 10,000 people. Linguistic and religious fractionalization are calculated as one minus the Herfindahl index. A larger value indicates a more fragmented population structure. The infant mortality rate is the number of children dying before the age of 1 among 100,000 births. The number of doctors is measured per 1,000 inhabitants. The variables for law referendum and budget referendum are binary indicator equal to one if they are mandatory and zero otherwise. The voter initiative is measured as the signature requirement in percentage of the eligible population.

**Table 3: Proportional Representation and the Scope of Government**

	Education		Welfare		Roads		Agriculture	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Proportional Representation	0.174 (0.026)***	0.101 (0.022)***	0.201 (0.039)***	0.331 (0.051)***	-0.237 (0.045)***	-0.528 (0.067)***	-0.392 (0.050)***	-0.275 (0.058)***
Population Size (log)	0.068 (0.011)***	-0.111 (0.063)*	-0.13 (0.015)***	0.249 (0.149)*	-0.062 (0.021)***	0.244 (0.153)	0.124 (0.022)***	-1.041 (0.140)***
% Urban Population	0.005 (0.001)***	-0.002 (0.001)*	0.002 (0.001)**	0.005 (0.002)**	-0.013 (0.001)***	-0.004 (0.002)**	-0.011 (0.001)***	0 (0.001)
Federal Subsidies (log)	0.052 (0.020)***	0.134 (0.014)***	0.124 (0.030)***	0.101 (0.028)***	0.328 (0.032)***	0.134 (0.033)***	0.407 (0.044)***	0.36 (0.036)***
% Employed in Agriculture	-0.004 (0.003)*	-0.007 (0.003)***	-0.008 (0.004)*	-0.04 (0.005)***	-0.041 (0.004)***	-0.002 (0.005)	0.041 (0.004)***	0.028 (0.004)***
% Employed in Industry	0.007 (0.002)***	0.005 (0.003)**	-0.009 (0.003)***	-0.004 (0.005)	-0.004 (0.003)	0.033 (0.006)***	0.033 (0.004)***	0.01 (0.005)**
Car Ownership (in %)	0.019 (0.003)***	0.004 (0.003)	0.019 (0.004)***	0.02 (0.005)***	0.032 (0.006)***	0.031 (0.006)***	0.007 (0.007)	0.047 (0.006)***
Doctors per capita	0.039 (0.038)	-0.073 (0.036)**	0.221 (0.060)***	0.297 (0.069)***	0.198 (0.060)***	-0.143 (0.073)*	-0.572 (0.082)***	-0.36 (0.081)***
Infant Mortality Rate (per 100,000)	0.001 (0.000)***	0.0001 (0.000)***	0.003 (0.001)***	0.001 (0.001)***	0.001 (0.001)	0.004 (0.000)***	0.003 (0.001)***	0.004 (0.001)***
Linguistic Fractionalization	0.828 (0.065)***	-0.721 (0.157)***	-0.177 (0.088)**	-0.253 (0.236)	0.979 (0.102)***	-1.258 (0.283)***	1.123 (0.118)***	-2.591 (0.269)***
Religious Fractionalization	0.289 (0.081)***	0.375 (0.135)***	0.133 (0.105)	-0.379 (0.253)	-0.729 (0.119)***	1.3 (0.244)***	-0.911 (0.134)***	1.301 (0.247)***
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Canton Fixed Effects	No	Yes	No	Yes	No	Yes	No	Yes
Observations	2690	2690	1774	1774	1899	1899	1774	1774
R-squared	0.94	0.97	0.86	0.92	0.83	0.9	0.82	0.93

*Notes:* The dependent variable is the log of real per capita spending on the categories shown in the first row (all expressed in Swiss Franks at 2000 prices). Expenditures for roads are available since 1925, those for welfare and agriculture since 1930. The variable proportional representation is a binary indicator equal of 1, if a canton has a proportional or mixed proportional system, and 0 in the case of a majoritarian system. Population is measured in logs, while urban population is calculated as the percentage of people living in cities with more than 10,000 inhabitants. Federal subsidies are the monetary transfers from the federal level measured in logs. Car ownership is the percentage of the population that owns a car while the number of doctors is measured per 1,000 inhabitants. The infant mortality rate is the number of children dying before the age of 1 among 100,000 births. Linguistic and religious fractionalization are measured as Herfindahl indices based on 3 groups respectively. All specifications include year fixed effects and controls for the age structure of the population, even columns also control for canton fixed effects. \* p<0.1, \*\* p<0.05 and \*\*\* p<0.01. Robust standard errors are reported in parentheses.

**Table 4: Proportional Representation and the Size of Government**

	Expenditures		Revenues	
	(1)	(2)	(3)	(4)
Proportional Representation	0.04 (0.017)**	0.01 (0.016)	0.028 (0.017)	-0.028 (0.016)*
Population Size (log)	-0.149 (0.008)***	-0.036 (0.045)	-0.143 (0.008)***	0.014 (0.048)
% Urban Population	0.003 (0.000)***	0.002 (0.001)***	0.003 (0.000)***	0.002 (0.001)***
Federal Subsidies (log)	0.092 (0.013)***	0.129 (0.010)***	0.081 (0.013)***	0.113 (0.010)***
% Employed in Agriculture	-0.023 (0.002)***	-0.006 (0.002)***	-0.025 (0.002)***	-0.009 (0.002)***
% Employed in Industry	-0.015 (0.001)***	0.002 (0.002)	-0.015 (0.001)***	0.001 (0.002)
Car Ownership (in %)	0.026 (0.002)***	0.015 (0.002)***	0.025 (0.002)***	0.015 (0.002)***
Doctors per capita	0.021 (0.030)	0.171 (0.028)***	0.035 (0.032)	0.221 (0.031)***
Infant Mortality Rate (per 100,000)	0.002 (0.000)***	0.001 (0.000)***	0.002 (0.000)***	0.001 (0.000)***
Linguistic Fractionalization	0.389 (0.041)***	-0.419 (0.099)***	0.3 (0.049)***	-0.743 (0.111)***
Religious Fractionalization	0.218 (0.049)***	-0.257 (0.085)***	0.15 (0.053)***	-0.263 (0.087)***
Year Fixed Effects	Yes	Yes	Yes	Yes
Canton Fixed Effects	No	Yes	No	Yes
Observations	2690	2690	2690	2690
R-squared	0.96	0.98	0.95	0.98

Notes: The dependent variable is the log per capita expenditures in columns (1) and (2) and log per capita revenues in columns (3) and (4) both measured in Swiss Franks at 2000 prices. The variable 'proportional representation' equals one if a Canton has a proportional or mixed proportional electoral system in place and zero otherwise. Population size is calculated as the log of a canton's population, while the urban population measures the percentage people living in cities with more than 10,000 inhabitants. All specifications include year fixed effects and controls for the age structure of the population, even columns also control for canton fixed effects. \* p<0.1, \*\* p<0.05 and \*\*\* p<0.01. Robust standard errors in parentheses. See also notes to previous table.

**Table 5: Does PR Affect Political Representation and Fragmentation?**

	Number of Parties		Party Fragmentation		Left-Wing Party	
	(1)	(2)	(3)	(4)	(5)	(6)
Proportional Representation	0.05 (0.049)	0.587 (0.066) <sup>***</sup>	0.081 (0.007) <sup>***</sup>	0.137 (0.010) <sup>***</sup>	0.066 (0.005) <sup>***</sup>	0.056 (0.007) <sup>***</sup>
Population Size (log)	0.637 (0.143) <sup>***</sup>	-0.611 (0.230) <sup>***</sup>	0.013 (0.002) <sup>***</sup>	0.007 (0.011)	0.018 (0.002) <sup>***</sup>	-0.046 (0.013) <sup>***</sup>
% Urban Population	0.001 (0.002)	-0.01 (0.003) <sup>***</sup>	0.001 (0.000) <sup>***</sup>	0.001 (0.000) <sup>***</sup>	0.001 (0.000) <sup>***</sup>	0.001 (0.000) <sup>***</sup>
Linguistic Fractionalization Index	-0.522 (0.115) <sup>***</sup>	-1.17 (0.334) <sup>***</sup>	-0.061 (0.014) <sup>***</sup>	-0.117 (0.030) <sup>***</sup>	-0.149 (0.012) <sup>***</sup>	-0.21 (0.027) <sup>***</sup>
Religious Fractionalization Index	2.375 (0.137) <sup>***</sup>	-0.994 (0.313) <sup>***</sup>	0.403 (0.013) <sup>***</sup>	-0.083 (0.036) <sup>**</sup>	0.231 (0.012) <sup>***</sup>	-0.007 (0.027)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Canton Fixed Effects	No	Yes	No	Yes	No	Yes
Observations	1963	1963	1963	1963	1963	1963
R Squared	0.46	0.75	0.65	0.83	0.53	0.83
Dependent Variable:						
Mean	4.48	4.48	0.655	0.655	0.177	0.177
Standard Deviation	(1.050)	(1.050)	(0.117)	(0.117)	(0.109)	(0.109)

*Notes:* The table reports regression estimates where the dependent variable is the number of parties in canton parliaments (columns (1) and (2)), one minus the Herfindahl index of party fragmentation in canton parliaments (columns (3) and (4)) and the percentage of seats held by the socialist or social democratic party in canton parliaments (columns (5) and (6)). The main independent variable is an indicator equal to one if the canton has adopted proportional representation and zero otherwise. All specifications include year fixed effects, even columns also control for canton fixed effects. Robust standard errors are reported in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$  and \*\*\*  $p < 0.01$ .

**Table 6: Direct and Indirect Effects of PR on the Size of Government**

	Baseline (1)	#Parties (2)	Fragmentation (3)	Left-Wing Party (4)	All 3 (5)
Proportional Representation	-0.008 (0.019)	-0.011 (0.019)	-0.055 (0.020)***	-0.057 (0.026)**	-0.065 (0.019)***
Number of Parties		0.007 (0.008)			-0.009 (0.008)
Party Fragmentation			0.372 (0.078)***		0.301 (0.080)***
% Left-Wing Parties				0.903 (0.114)***	0.526 (0.082)***
Canton Controls	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Canton Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	1953	1953	1953	1953	1953
R Squared	0.98	0.98	0.98	0.98	0.98
Std. Dev. Political Variable		1.05	0.118	0.109	

*Notes:* The table reports regression results where the dependent variable is log per capita total expenditures. All specifications include year and canton fixed effects as well as all time-varying control variables of the baseline estimates reported in Table 4. Column (1) reestimates the baseline for the subset of observations for which we have the party seats in canton parliaments. Column (2) adds the number of parties to that specification, while column (3) includes the party fragmentation (as measured by 1 minus the Herfindahl index) instead. Column (4) includes the percentage of seats held by the socialist or social democratic party while the last column includes all three measures. Robust standard errors are reported in parentheses. \* p<0.10, \*\* p<0.05 and \*\*\* p<0.01.

**Table 7: Summary Statistics Local Data**

	Observations	Mean	Std. Dev.
<b><u>Political System</u></b>			
Executive Elected by Plurality Rule	5081	0.72	0.45
Mandated Electoral Rule for Executive	5081	0.53	0.50
Size of Executive (log)	5056	1.77	0.29
Community has Parliament	5852	0.19	0.40
Legislative Elected by Proportional Rule	778	0.77	0.42
Mandated Electoral Rule for Legislative	1134	0.14	0.35
Size of Local Parliament (log)	670	3.42	0.49
<b><u>Size of Government</u></b>			
Administrative Personnel	5852	0.86	5.65
Administrative Personnel (log)	5852	-1.03	1.00
Budget Deficit?	3761	0.31	0.46
<b><u>Control Variables</u></b>			
Population	5852	2491	7771
Nonemployed (%)	5852	35.91	13.89
Children under 15 (%)	5852	20.58	9.11
Population 65 and Above (%)	5852	31.16	32.43
Employed in Primary Sector (%)	5852	7.42	10.22
Employed in Secondary Sector (%)	5852	36.51	37.00
Protestants (%)	5852	42.47	29.73
Canton Language French or Italian	5852	0.45	0.50
Community Located in the Alps	5805	0.31	0.46

Notes: The table shows means, standard deviations and extreme values for our sample of local communities in 1988, 1994, 1998 and 2005. The size of the executive and parliament (if any) is expressed in logs. Administrative personnel represents the size of the administration per 100 inhabitants (both in levels and logs). Information on whether the community ran a budget deficit is not available in 1988. The percentage of nonemployed and employed in primary sector are measured in terms of the labor force while the percentage of children and protestants in terms of the total population.

**Table 8: Canton Mandates and the Size of Local Administration**

	Communities that Adopted Electoral Rule		Communities with Mandates
	Legislative (1)	Executive (2)	Executive (3)
Proportional Rule	0.017 (0.096)	-0.038 (0.042)	0.058 (0.072)
Log Population	-0.177 (0.060)***	-0.485 (0.024)***	-0.756 (0.062)***
Canton Language French or Italian	-0.255 (0.105)**	-0.06 (0.052)	-0.120 (0.035)***
% Protestants	0.004 (0.002)*	0.001 (0.001)	0.003 (0.001)***
% Children under 15	-0.077 (0.017)***	-0.017 (0.004)***	-0.020 (0.005)***
% Nonemployed	-0.043 (0.012)***	-0.009 (0.003)***	-0.007 (0.004)*
% Employed in Primary Sector	0 (0.007)	0.006 (0.003)**	-0.001 (0.002)
Community Located in the Alps	0.193 (0.107)*	-0.025 (0.040)	-0.030 (0.051)
Population Size Dummies	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Observations	620	2381	2679
R Squared	0.17	0.37	0.31

*Notes:* The table reports regression results where the dependent variable is the log of administrative personnel per capita. The main independent variable is whether a community has a proportional electoral system in place. The sample in the first two columns is restricted to communities that choose their electoral system for the legislative (1) or executive (2). The sample in columns (3) is restricted to communities where the canton mandates the electoral rule for the executive. All specifications include year effects. See the previous table for a description of the control variables. Robust standard errors that allow for clustering at the canton level are reported in parentheses.

**Table 9: Propensity Score Matching**

	Communities that Adopted Electoral Rule	
	Legislative (1)	Executive (2)
Log Population	0.979 (0.162) <sup>***</sup>	1.189 (0.069) <sup>***</sup>
Canton Language French or Italian	1.721 (0.367) <sup>***</sup>	7.568 (0.656) <sup>***</sup>
% Protestants	-0.015 (0.007) <sup>*</sup>	-0.006 (0.004)
% Children under 15	-0.068 (0.046)	-0.011 (0.013)
% Nonemployed	0.085 (0.027) <sup>***</sup>	0.027 (0.012) <sup>**</sup>
% Employed in Primary Sector	-0.054 (0.027) <sup>**</sup>	-0.017 (0.009) <sup>*</sup>
Community Located in the Alps	0.651 (0.370) <sup>**</sup>	-1.529 (0.229) <sup>***</sup>
Year Fixed Effects	Yes	Yes
Canton Fixed Effects	No	Yes
Observations	621	2,679
R Squared	0.21	0.43
Log-likelihood	-270.88	-917.92
<u>Treatment on the Treated (ATT)</u>		
Nearest Neighbor Matching	0.106 (0.127)	-0.05 (0.100)
Biweight Kernel Matching	0.124 (0.162)	-0.049 (0.098)
Communities with Common Support		
_Treated	436	1,008
_Untreated	177	1,340

Notes: The table the coefficient from a logit regression where the dependent variable is a binary indicator equal to one if the community elects the parliament (column (1)) or executive (column (2)) according to proportional rule and zero otherwise. All specifications include year and canton fixed effects. The matching procedure uses both the method of nearest neighbors and kernel matching using a biweight kernel. We impose common support on the propensity score and also trim 2 percent of the observations with the highest/lowest values of the predicted propensity score. The average treatment on the treated effect for both matching method is reported at the bottom together with the number of observations in the treated and untreated group. Standard errors reported in parentheses are not adjusted for the first stage estimation of the propensity score. \* p<0.1, \*\* p<0.05 and \*\*\* p<0.01.



**Table A1: Robustness Checks**

	<u>Size</u> (1)	<u>Education</u> (2)	<u>Welfare</u> (3)	<u>Roads</u> (4)	<u>Agriculture</u> (5)
(1) Lagged Dependent Variable	-0.004 (0.006)	0.008 (0.009)	0.056 (0.019)***	-0.136 (0.061)**	-0.06 (0.018)***
(2) First Differences	-0.008 (0.008)	0.017 (0.008)**	0.018 (0.017)	-0.046 (0.043)	-0.034 (0.016)**
(3) Serial Correlation in Spending	0.003 (0.008)	0.032 (0.011)***	0.079 (0.022)***	-0.122 (0.025)***	-0.065 (0.023)***
(4) Democratization	0.011 (0.017)	0.076 (0.023)***	0.362 (0.048)***	-0.517 (0.069)***	-0.305 (0.060)***
(5) Women's Suffrage	0.003 (0.016)	0.097 (0.021)***	0.311 (0.050)***	-0.472 (0.066)***	-0.227 (0.055)***
(6) Ideological Shifts	-0.017 (0.019)	0.148 (0.022)***	0.351 (0.053)***	-0.517 (0.070)***	-0.242 (0.055)***
(7) Other Political Changes	0.012 (0.021)	0.022 (0.028)	0.312 (0.052)***	-0.548 (0.065)***	-0.247 (0.058)***
(8) Region-specific time trends	0.010 (0.016)	0.101 (0.022)***	0.331 (0.051)***	-0.528 (0.067)***	-0.275 (0.058)***
(9) Election Years Only	0.05 (0.034)	0.121 (0.048)**	0.211 (0.110)*	-0.616 (0.124)***	-0.27 (0.138)*
(10) Drop Cantons with Mixed Proportional System	-0.065 (0.077)	0.167 (0.023)***	0.113 (0.056)**	-0.718 (0.128)***	-0.258 (0.054)***
(11) Expenditure Level	-221.378 (70.228)***	37.902 (15.298)**	37.055 (24.028)	-688.685 (96.410)***	-64.291 (12.245)***
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Canton Fixed Effects	Yes	Yes	Yes	Yes	Yes

*Notes:* The dependent variables are the log expenditures in the category shown in the heading. All specifications include year and canton fixed effects and the same controls as in table 3. The coefficients reported are for the binary indicator of proportional representation. The first specification adds log expenditures in the previous period while row (2) estimates the spending relationship in first differences. The third row implements the before-after estimator proposed by Bertrand et al. (2004) to account for serial correlation. Row (4) adds controls for the mandatory budget referendum, law referendum, voter initiative and the number of years since the executive is directly elected by the voters while row (5) adds the year when suffrage was extended to women. To control for changes in ideology, row (6) adds the share of divorced and protestants. Row (7) includes controls for the electoral cycle and sizes of executive and legislative. Row (8) includes time trends for 7 separate regions (based on Eurostat's NUTS 2 classification) to control for geographic adoption patterns. Row (9) restricts the sample to election years while row (10) drops canton-year observations with a mixed proportional systems. Row (11) uses the level of expenditures as the dependent variable. \* p<0.1, \*\* p<0.05 and \*\*\* p<0.01. Robust standard errors are in parentheses. See also notes to previous tables.

**Table A2: Correlates with Adoption of PR**

	Proportional Representation	
	Estimate	Std.Error
Year since Executive Elected	-0.212	(0.272)
Year Social Democratic Party Founded	1.083	(0.947)
Year Law Initiative Adopted	-0.38	(0.345)
Year Mandatory Law Referendum Adopted	-0.073	(0.023)***
Year Budget Referendum Adopted	-0.258	(0.180)
Federal Subsidies per capita (in logs), 1890	-0.272	(0.282)
Canton Population, 1890	0.000	0.000
Population Aged 0-19 Years (in %), 1890	3.445	(2.506)
Population Aged 20-39 Years (in %), 1890	-4.74	(2.804)
Population Aged 40-64 Years (in %), 1890	0.855	(4.875)
Population Aged over 65 Years (in %), 1890	11.074	(7.183)
Employed Agriculture (in %), 1890	0.498	(0.426)
Employed in Industry (in %), 1890	-0.456	(0.496)
Labor Force Participation (in %), 1890	-1.757	(1.091)
Urban Population (in %), 1890	-0.272	(0.282)
Linguistic Fractionalization Index, 1890	-46.197	(58.939)
Religious Fractionalization Index, 1890	-83.204	(42.124)*
Car Ownership (in %), 1914	-71.87	(42.480)

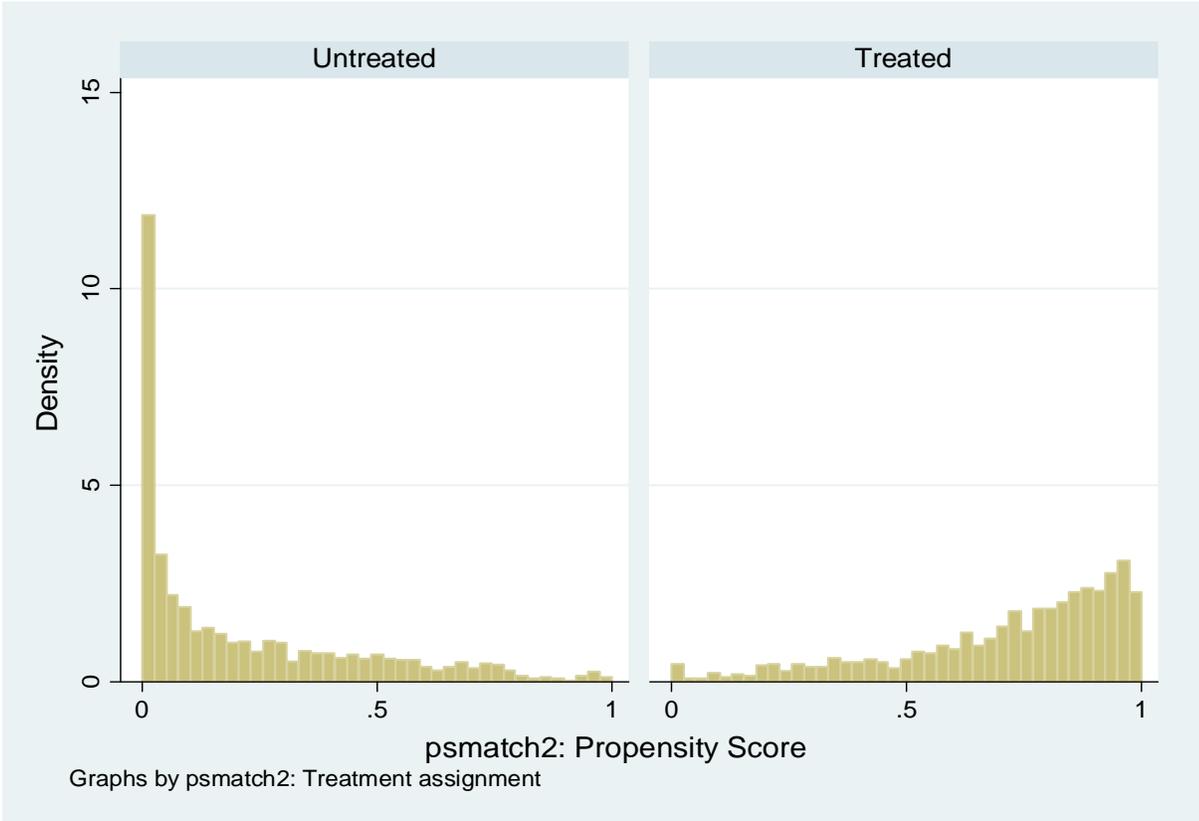
Notes: The table reports estimates from bivariate regressions where the dependent variables are the year when proportional representation was introduced. All demographic variables are for 1890 except for car ownership, which is first available in 1914. The linguistic and religious fractionalization measures are based on Herfindahl indices for three groups respectively. \* p<0.1, \*\* p<0.05 and \*\*\* p<0.01.

**Table A3: Selective Internal Migration in Response to Proportional Representation**

	1888-2000	1920-2000	1940-2000	1960-2000	1888-2000	1920-2000	1940-2000	1960-2000
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Years of Proportional Representation	-0.019 (0.025)	0.022 (0.026)	0.031 (0.026)	0.021 (0.027)	0.103 (0.048)**	0.055 (0.039)	0.009 (0.060)	-0.047 (0.101)
Canton Fixed Effects	No	No	No	No	Yes	Yes	Yes	Yes
Number of Observations	278	207	161	115	278	207	161	115
R Squared	0.67	0.7	0.74	0.8	0.89	0.92	0.93	0.94

Notes: The table reports regression results where the dependent variable is the percentage of Swiss population living in a canton was also born in that same canton calculated from Census data over the time period specified in the first row. The main independent variable is the number of years since proportional representation was adopted. The control variables include the age structure of the population, population size (in logs), urbanization, share employed in agriculture and manufacturing, overall and female labor force participation rate, the share of foreigners as well as language and religious heterogeneity. All specifications include census year fixed effects. Columns (5) to (8) also include canton fixed effects. \*  $p < 0.1$ , \*\*  $p < 0.05$  and \*\*\*  $p < 0.01$ . Robust standard errors are reported in parentheses.

**Figure A1: Support of Estimated Propensity Score by Treatment Status**



*Notes:* The figure shows the estimated propensity score for communities that chose majoritarian rule ('untreated') and for communities that chose proportional rule ('treated'). The matching estimator calculated in table 9 then imposes common support among the two groups.