

# Disproportional Threat:

## Redistricting as an Alternative to Proportional Representation\*

Patrick Emmenegger<sup>†</sup> and André Walter<sup>‡</sup>

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Analyzing the voting behavior of Swiss members of parliament (MP) using newly collected individual, district, and cantonal level data, we show that both electoral disproportionalities and the insurgent parties' electoral potential are important determinants of MP voting behavior on the adoption of proportional representation (PR). However, in contrast to the prominent electoral threat thesis, the insurgent party's high electoral potential decreases the probability that MPs of established parties support PR. The reason for this relationship is partisan redistricting, whose relevance has so far been largely ignored in the literature. We demonstrate that adapting electoral district boundaries for political reasons, if possible in a given institutional context, can be a powerful alternative to the adoption of PR, because it allows established parties to retain parliamentary majorities even as an insurgent party's electoral potential increases.

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<sup>†</sup>University of St.Gallen, Department of Political Science, Müller-Friedberg-Strasse 8, 9000 St.Gallen, Switzerland. URL: <https://pemmenegger.com/>, Email: [patrick.emmenegger@unisg.ch](mailto:patrick.emmenegger@unisg.ch).

<sup>‡</sup>University of St.Gallen, Department of Political Science, Müller-Friedberg-Strasse 8, 9000 St.Gallen, Switzerland. URL: <https://andrewalter.netlify.com/>, Email: [andre.walter@unisg.ch](mailto:andre.walter@unisg.ch).

## Introduction

Electoral systems have far-reaching political and economic consequences (Döring & Manow, 2017). It is therefore unsurprising that the adoption of proportional representation (PR) in the period before the Second World War has received extensive scholarly attention (e.g. Ahmed, 2013; Blais, Dobrzynska, & Indridason, 2004; Boix, 1999; Calvo, 2009; Colomer, 2005; Leemann & Mares, 2014; Rodden, 2009). Yet, despite a large body of research, there seems to be little consensus on why countries adopted PR.

Most of the literature assumes that the main alternative to PR is majority-plurality representation (MR) in single-member districts, whose boundaries are more or less set in stone. In this situation, the prominent electoral threat thesis (e.g. Boix, 1999; Leemann & Mares, 2014; Rokkan, 2009) expects members of parliament (MPs) of established parties in marginal districts facing credible competition from insurgent party candidates to support the adoption of PR.

In contrast, we highlight the role of partisan redistricting under MR, whose effectiveness as an instrument of containment may be even accentuated in the presence of multi-member districts (Tan & Grofman, 2018). Adapting electoral district boundaries for political reasons is an important alternative to PR, because it allows established parties to retain parliamentary majorities even as the insurgent parties' electoral potential increases (e.g. Cain, 1985; Gul & Pesendorfer, 2010; King & Browning, 1987; Tufte, 1973).<sup>1</sup>

Partisan redistricting is primarily a powerful instrument under MR. Once countries adopt PR, redistricting loses much of its effectiveness (Grofman, 2016). Hence, in contrast to the electoral threat thesis, if established parties choose partisan redistricting as their defensive strategy (rather than PR), their interest in defending MR

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<sup>1</sup>Partisan redistricting is of course predicated on maintaining control over the relevant decision-making body in charge of redistricting (typically the parliament).

*increases* with the insurgent parties' electoral potential.<sup>2</sup> When insurgents are weak, district-level electoral alliances are likely to be sufficient to maintain control over the electoral district (Schröder & Manow, 2018). Yet, as the new parties become stronger, established parties may resort to partisan redistricting to protect their seats, which, however, is predicated on maintaining MR.

Partisan redistricting to contain insurgent parties is likely to result in increasing electoral disproportionalities, because electoral districts are regularly adapted to prevent the translation of increasing electoral potential into larger seat shares in parliament. We therefore expect to find the staunchest supporters of MR among MPs of established parties, which owe their seats to electoral disproportionalities due to partisan redistricting and face insurgent parties with high electoral potential. These MPs have the most to lose from the adoption of PR, because their ability to hold their seats is entirely dependent on the safeguards provided by partisan redistricting under MR.

To evaluate these expectations, we echo recent calls to engage in micro-historical analysis (Mares, 2015; Ziblatt, 2017). More precisely, we follow Leemann and Mares (2014) and examine the voting behavior of Swiss members of parliament in multiple votes on the adoption of PR in the period 1900-1918. By analyzing strategic political behavior in a concrete institutional context, we provide powerful tests of several competing hypotheses using newly collected data at the individual, district, and cantonal level. In addition, as we explain below, the Swiss case offers particularly promising conditions to examine the adoption of PR. Importantly, however, our arguments travel well beyond the Swiss case, as we demonstrate in the conclusion. In fact, re-drawing district lines to contain insurgent parties might have been just as common as its alternative, the adoption of PR. More generally, our analysis demonstrates the importance of examining hypotheses about strategic political behavior in the concrete institutional context. If not for the possibility to adapt electoral district boundaries for political reasons, Switzerland's established parties, as suggested by Boix (1999),

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<sup>2</sup>We focus on new parties' electoral potential rather than district-level vote shares. Electoral potential denotes the expected vote share a party would receive under PR. We return to this point below.

would have seen much more benefit in adopting PR.<sup>3</sup>

In this paper, we provide an account of why MPs of established parties in marginal districts, who faced credible competition from insurgent party candidates supported MR rather than PR. Hence, we explain why Switzerland did *not* adopt PR by an act of parliament. However, Switzerland eventually adopted PR in 1918 (Lutz, 2004). The reason is direct democracy, which allows any political group to put a proposal to a nation-wide binding popular vote if at least 50'000 citizens support it. Importantly, government and parliament cannot change the proposal. Consistent with our expectations, the ruling parties opposed the proposal, but could not prevent its adoption despite an extensive political campaign. Since the popular vote is not part of our analysis, we can only speculate about the reasons for its acceptance. Yet, given the large electoral disproportionalities, it is certainly plausible to argue that the composition of parliament no longer reflected the population's political preferences. We will briefly return to role of direct democracy in the conclusion.

In the following section, we review the literature on electoral system choice. We then forward our argument concerning redistricting as an alternative to PR. After providing an overview of the Swiss case and discussing our research design, we present our empirical results. A final section summaries our main findings and provides some preliminary evidence that partisan redistricting was common in cases other than Switzerland.

## **Rokkan's two roads to electoral reform**

Most of the literature on electoral system choice starts from the assumption that political groups try to shape electoral rules to their advantage (Benoit, 2004). Hence, the literature on the adoption of PR in democratic countries in the early 20<sup>th</sup> century

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<sup>3</sup>Leemann and Mares (2014) find empirical support for the electoral threat thesis for Germany, which is consistent with our account because in Germany, unlike Switzerland, partisan redistricting was not an option for established parties.

has mainly focused on the conditions under which established parties were interested in such reforms. Two roads to PR based on Rokkan (2009) are typically discussed.<sup>4</sup>

Several scholars argue that the adoption of PR was a reaction of the established parties to the rise of insurgent (in this period typically socialist) parties following suffrage extension (the so-called *electoral threat thesis*). For instance, Boix (1999) argues that if the electoral arena changes, in general because of the emergence of a socialist party, the established parties consider altering the electoral system, if they believe that the emergence of such a party threatens their electoral viability in the future.<sup>5</sup> However, whether established parties favor the adoption of PR is a function of, first, the type of electoral market in which the old parties compete with each other, and, second, the extent to which the old parties share voters with the insurgent party.

In a segmented electoral arena in which the support of each party is highly concentrated in a particular geographic area or social sector, the position of each party toward PR is determined by the extent to which the new entrant threatens its hegemony in its electoral segment. If threatened by the new party, established parties support PR; otherwise they oppose PR. In more competitive electoral arenas, where parties contend for some fraction of the electorate, the position of the established parties is a function of the extent to which they can expect to be the dominant nonsocialist party. As Boix (2010) argues, if the party could expect to become the focal point around which nonsocialist voters would eventually coordinate, it did not have an incentive to support PR. In contrast, if the old party could not expect to become the dominant nonsocialist party, it had a strong incentive to support PR.<sup>6</sup>

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<sup>4</sup>There are also economic explanations for the adoption of PR (Cusack, Iversen, & Soskice, 2007; Rogowski, 1987). We do not discuss them here, but we consider them in our empirical analysis.

<sup>5</sup>According to Ahmed (2013), it is not the electoral strength of socialist parties that matters, but rather their ideological radicalization and thus the (radical) political consequences in the event of a socialist victory.

<sup>6</sup>Although the electoral threat thesis is able to account for the adoption of PR in several cases (Kreuzer, 2010), the literature has identified theoretical problems. For instance, Schröder and Manow (2018) argue that it exaggerates the extent to which established parties faced coordination problems. Using German electoral data from 1890 to 1918, they show that established parties were successful in using district-level electoral alliances to protect their seats against insurgent parties. Given these concerns, some scholars have struggled to replicate Boix' findings (e.g. Andrews & Jackman, 2005; Blais et al., 2004; Cusack et al., 2007).

Rokkan (2009, p. 157) has forwarded a second argument to explain the adoption of PR. He argues that in particular in the period before World War I (and thus before socialist parties became serious electoral threats), PR was adopted as a form of minority protection in Europe's ethnically most heterogeneous countries to safeguard the political system. While it is somewhat unlikely that established parties sacrificed (substantial) seat shares without obtaining clear benefits in return, Calvo (2009, p. 255) notes that Rokkan's second road to PR "fits a wide body of empirical research that stresses the importance of uncertainty, seat-vote distortions, and redistricting problems in the elimination of majoritarian electoral rules in the early twentieth century." Indeed, electoral competition under MR increases the degree of electoral disproportionality and the sensitivity of electoral regimes to redistricting (Colomer, 2007; Rodden, 2009; Samuels & Snyder, 2001).

When did electoral disproportionality lead to the adoption of PR? Calvo (2009, p. 256) argues that suffrage expansion and the resulting increase in the number of parties could lead to "significant partisan biases that adversely affected well-established parties." Put differently, when the established parties themselves began to suffer from electoral disproportionality, they pushed for PR. Similarly, Rodden (2009, p. 5) argues that "parties with inefficient geographic distributions of support are the most vocal supporters of proportional representation" because they are most likely to suffer from the entry of new parties and subsequent disproportionalities. In most countries, these were socialist and liberal parties, while the "rural-based party of the right [...] was unscathed by socialist entry and actually benefited from the coordination problem on the left" (Rodden, 2009, p. 6). In these accounts, PR was adopted when the disadvantaged parties had sufficient leverage to extract the desired form.

There is considerable evidence that party positions on the adoption of PR are influenced by electoral disproportionalities (Andrews & Jackman, 2005; Calvo, 2009; Lee-mann & Mares, 2014). However, there is an important problem with these accounts. It remains unclear why the advantaged parties did not simply use institutional engi-

neering (e.g. redistricting) to protect their privileged position. Put differently, these accounts can convincingly explain parties' position toward PR, but it remains unclear how the disadvantaged parties were able to overcome the advantaged parties' resistance.

Some authors have identified the role of uncertainty as the key to this puzzle. Colomer (2005) argues that in situations of high uncertainty or serious threat, actors prefer electoral rules that reduce the risk of becoming absolute losers. Uncertainty (i.e. unpredictable election results) is higher under MR, in particular as the number of parties increases. Colomer (2005, p. 8) therefore argues that "the higher the effective number of parties, the weaker the expectation will be for any single party to become the sure winner, and, thus, the more likely will be its preference for an inclusive electoral system" such as PR (see also Blais et al., 2004). Next to electoral rules, Andrews and Jackman (2005, p. 66) identify the geopolitical situation in the early 20<sup>th</sup> century as a source of "extreme uncertainty" and argue that in this situation, "the safest choice typically involved some form of proportional representation." However, why exactly electoral reform should be the safer choice in times of extreme uncertainty remains unclear (Pilet & Bol, 2011). Similarly, it remains unclear why the established parties did not use other means to reduce uncertainty such as institutional engineering.

### **The overlooked role of redistricting**

Most of the literature on electoral system choice emphasizes the strategic considerations of established elites when facing competition from insurgent parties. When, as in the Swiss case, democracy was established, male universal suffrage was granted, and open electoral manipulation was no longer possible, the literature argues that support for PR came from MPs of established parties in marginal districts, who faced credible competition from insurgent candidates (e.g. Boix, 1999; Leemann & Mares, 2014; Rokkan, 2009).

Yet, electoral system reforms are complex political decisions that affect a multitude of issues. Most notably, reforms are inevitably linked to the size and structure of electoral districts. The electoral threat thesis implicitly assumes that the main alternative to PR is MR in single-member districts, whose boundaries are more or less set in stone. However, this is a great simplification, as there existed a variety of MR systems and multi-member districts were quite common (Colomer, 2007). In addition, electoral district boundaries were often changed, for instance to deal with malapportionment following population growth.

Of course, there are also political reasons for redistricting (Cain, 1985; Gul & Pendorfer, 2010; King & Browning, 1987; Tufte, 1973). Electoral competition under MR is prone to lead to large electoral disproportionalities and is highly sensitive to redistricting decisions (Colomer, 2007; Samuels & Snyder, 2001; Taagepera, 1973). The literature thus expects parties benefiting from such disproportionalities to support MR, while PR is adopted when the disadvantaged parties have sufficient leverage to extract the desired reform (Andrews & Jackman, 2005; Calvo, 2009; Rodden, 2009).

However, the literature on the adoption of PR has overlooked the possibility that the advantaged parties might use redistricting to contain insurgent parties (but see Ahmed, 2013). If the advantaged parties have political control over the relevant decision-making body in charge of redistricting (which was rather common, see [Table A6](#) in the appendix), they can use the reform of electoral district boundaries to protect their parliamentary majority also for the future. In this process, the advantaged parties' goal is to maximize the number of the insurgent party's votes that do not contribute to the election of one of its candidates, called bias. This can be done in two main ways. On the one hand, a minority of insurgent party's voters can be moved into a district dominated by the advantaged parties, thereby 'wasting' all of the insurgent party's votes for the losing candidates ("cracking"). On the other hand, geographical boundaries can be adapted to create safe districts, in which insurgent party's candidates win with overwhelming majorities, thus 'wasting' a lot of votes on



few seats ("packing"). In both cases, the advantaged parties deny the insurgent party an efficient use of its votes.

In contrast, under PR, partisan redistricting is a more limited instrument to contain insurgent parties (Grofman, 2016; Martinez i Coma & Lago, 2018).<sup>7</sup> As Carey and Hix (2011, p. 384) show, even in case of rather small districts, PR is quite effective at reducing disproportionalities between parties' shares of votes won and seats won in legislative elections. Of course, this is not to claim that redistricting does not play any role under PR, but as an instrument of containment, it is clearly less effective.

Importantly, such partisan redistricting is not restricted to single-member districts, but is equally meaningful under MR in multi-member districts (Tan & Grofman, 2018). In fact, multi-member districts provide designers of electoral districts with even more flexibility because they allow for changes in the size (i.e. number of seats) as well as the geographical boundaries of districts. Hence, the relevant difference is not between single-member and multi-member districts, but whether established parties have sufficient control over the decision-making body in charge of redistricting (e.g. the parliament) in order to use it for political purposes.<sup>8</sup> However, we hasten to add that the effectiveness of partisan redistricting is of course also a function of electoral geography (Chen & Rodden, 2013).

These considerations allow us to propose an *adapted* electoral threat thesis. Generally, we expect parties to evaluate the status quo against their seat to vote relation under PR. If redistricting as a containment strategy is not available, we expect, in line with Boix (1999), established parties to support the adoption of PR if they believe the emergence of new parties to threaten their electoral viability. For instance, Leemann and Mares (2014) show for Germany that the demand for PR came from MPs of estab-

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<sup>7</sup>There are, however, also possibilities under PR, as Calvo and Micozzi (2005) show.

<sup>8</sup>The adoption of single-member districts is thus not necessary to rely on redistricting as a containment strategy, as Ahmed (2013) argues. Rather, single-member plurality (SMP), as adopted in Great Britain in 1884, can be understood as a middle way between the adoption of PR and the continued reliance on MR in multi-member districts, because SMP provides established parties with some protection from insurgent parties by increasing the overall proportionality of the electoral system, while also offering the possibility to rely on some redistricting as a containment strategy.

lished parties in marginal districts. However, in Germany, redistricting as a defensive strategy under MR was not easily available to the established parties. Rather, the task of adapting boundaries of electoral districts was left to the (rather) politically neutral state bureaucracy. Hence, German MPs of established parties had to pin their hopes on PR to survive the electoral threat.<sup>9</sup>

In contrast, if partisan redistricting as a containment strategy is available, established parties face a different strategic situation. Rather than hoping to survive, established parties have an instrument at their command that can be used to keep insurgent party candidates out of parliament. Established parties have therefore no interest in adopting PR, which would not only put an end to their parliamentary majority, but also remove their most powerful containment instrument. Quite the contrary, as the insurgent party's electoral potential increases, containment by means of redistricting becomes even more important.

Yet, containment by means of redistricting is likely to result in increasing electoral disproportionalities. It is easy to see why this is the case. While redistricting is a defensive strategy to prevent an insurgent party from winning seats, it does not reduce the party's *electoral potential* (the vote share the party would receive under PR). As the insurgent party's electoral potential grows, established parties employ redistricting to safeguard their seats, but this protection necessarily comes at the cost of increasing electoral disproportionalities (understood as seat share minus electoral potential). Hence, electoral disproportionalities capture the extent to which established parties have relied on partisan redistricting to contain an insurgent party.

Hence, *if* redistricting is used as a containment strategy, Rokkan's two roads to PR (cf. Calvo, 2009) become intertwined: The more MPs benefit from electoral disproportionalities (second road) and the higher the insurgent party's electoral threat (first road), the stronger are the advantaged MPs' incentives to defend the MR electoral

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<sup>9</sup>However, by *not* adapting electoral districts to changes in the population, the state bureaucracy de facto advantaged the Conservatives in their rural strongholds (Reibel, 2007, pp. 37–38). Electoral geography thus influences the effectiveness of redistricting as a containment strategy.

system. In contrast, the more a party is disadvantaged by the current electoral system and the higher its electoral potential would be under PR, the more its MPs can be expected to support the adoption of PR.

As a result, we expect a *conditional* effect of an insurgent party's electoral potential on MPs' support for PR. Consistent with the standard version of the electoral threat thesis (cf. Boix, 1999), we expect MPs of established parties *not* benefiting from electoral disproportionalities to support PR when facing strong competition from insurgent candidates. Unable to rely on redistricting to deal with insurgents, these MPs' only hope to hold their seats is to push for PR. In contrast, we expect MPs of established parties benefiting from electoral disproportionalities to support MR when facing a powerful challenger. Having relied on redistricting to contain insurgents in the past (as reflected in large disproportionalities), these MPs' ability to hold their seats is predicated on their continued ability to use redistricting to fend off insurgents. Since redistricting as a containment strategy is effective only under MR, we expect the presence of an electorally strong insurgent party to fortify these MPs' support for MR.

Importantly, the small number of insurgent party MPs behave similarly – albeit for different reasons. Their support for PR is also conditional on electoral disproportionalities.<sup>10</sup> Insurgent party MPs disadvantaged by the electoral system made it to parliament despite the established parties' best efforts to exclude them by means of partisan redistricting. Moving to PR would thus greatly benefit them and their party, because it would enable them to translate their full electoral potential into seats. In contrast, in the rare case of insurgent party MPs benefiting from electoral disproportionalities, we expect them to have less interest in PR. In this case, the insurgent party has managed to capture a geographical region in a way that even redistricting could not keep them out of parliament. From the point of view of the electoral threat thesis, this is the scenario in which an insurgent party begins to show interest in MR, because they might become the dominant party (cf. Calvo, 2009).

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<sup>10</sup>In case of low electoral potential, insurgent party candidates are unlikely to enter parliament in the first place.

## The Swiss case

We examine these expectations analyzing electoral reforms in Switzerland in the period 1900-1918. Before the adoption of PR in 1918, Switzerland relied on a two-round (three-round before 1900) majority run-off system in multi-member districts (with a plurality run-off in the last round).<sup>11</sup> Voters had as many votes as there were seats in a district. Landslide victories for the most popular party were common. After 1911, the largest district had eight seats, while the median number of seats per district was four (Carstairs, 1980, pp. 136–141; Lutz, 2004, pp. 280–282).

Unsurprisingly, this electoral system led to large electoral disproportionalities. Partly as a result of these disproportionalities, the Radical Party and its smaller political allies (Democratic Party and Liberal Party) controlled throughout the whole period a majority of seats in the Swiss parliament (see Table 1). For the sake of simplicity, we refer to these three parties as the "radical movement."<sup>12</sup> This is particularly important because since 1850 the task of adapting existing and creating new electoral districts was assigned to the Swiss parliament.<sup>13</sup> The radical movement's parliamentary majority thus allowed it to use the adaptation of electoral district boundaries to protect its parliamentary majority also for the future.

Electoral districts were adapted in 1850, 1863, 1872, 1881, 1890, 1902, and 1911, each time following a national census. Although these reforms were officially supposed to deal with malapportionment following population growth, there is clear evidence of

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<sup>11</sup>We focus on the lower chamber. Elections for the upper chamber were determined by cantonal law and rules differed widely (including nomination by cantonal governments).

<sup>12</sup>The three parties successfully used district-level electoral alliances to solve coordination problems and to protect their seats against social democratic insurgents. Electoral alliances are defined as the endorsement of a candidate by more than one party (cf. Schröder & Manow, 2018). In contrast to electoral cartels (Cox, 1997), seats are still allocated to candidates directly. Electoral alliances were facilitated by the run-off system in multi-member districts, which allowed them to apportion the seats based on their electoral strength. For instance, in the 1917 election, the three parties won 67 of their 122 seats based on such electoral alliances (Gruner, 1978b, pp. 325–40).

<sup>13</sup>There was one political limit to redistricting under MR. Swiss federalism made the creation of electoral districts across cantonal borders impossible (art. 73 in the 1874 constitution). However, within cantonal borders, there were no limits to redistricting. The federal structure of Switzerland, consisting of (then) 25 cantons, also determined the electoral districts under PR (Gruner, 1978a; Natsch, 1967, 1972).

Table 1: Seats by Party in National Council at the Time of the Four PR Votes

	1900	1910	1914	1918
	Seats			
Radicals	79	96	106	97
Democrats	12	14	15	13
Liberals	20	15	14	12
Catholic Conserv.	32	35	38	41
Social Democrats	4	7	15	22
Total	147	167	189	189

Source: Gruner (1978b, pp. 418–424). Please note that the numbers for the Radical Party and the Democratic Party slightly deviate from official statistics, because a number of Democrats from the canton Zurich joined the Radicals' parliamentary group. In addition, the number of seats of the five main parties does not add up to the total number of seats in 1918 because four independent MPs are not included.

political bias. Consider the example of the canton St.Gallen (cf. Gruner, 1978a), which for national elections was divided into four electoral districts with two seats each. Regional elections, which rely on districts determined by the cantons themselves, show that the Radicals and the main opposition party, the Catholic Conservatives, were about equally strong (77 to 73 seats in the 1848 cantonal election). Yet, in the national elections of 1848, 1851, and 1854, with districts determined by the Swiss parliament, the Radicals managed to win all of the canton's eight seats. After the Catholic Conservatives were able to win three of the eight seats in the 1857 election, the Radicals used the district reform in 1863 to contain the Catholic Conservatives. The Swiss parliament decided to award the canton St.Gallen an additional seat, but divided the canton into three electoral districts with three seats each. In the subsequent election, in fall 1863, the Radicals won again all of the (now) nine seats.

Historically, the Catholic Conservatives – the losers of the short Swiss civil war of 1847 – were the main opposition party. They were the first victims of the radical movement's institutional engineering by means of redistricting. As Figure 1 shows, the Catholic Conservatives typically won fewer seats than their electoral potential would have indicated. However, due to their geographically highly concentrated voter base in the Catholic heartlands of Switzerland, they could gain substantial representation in parliament over time (Rodden, 2009). The effectiveness of redistricting as an

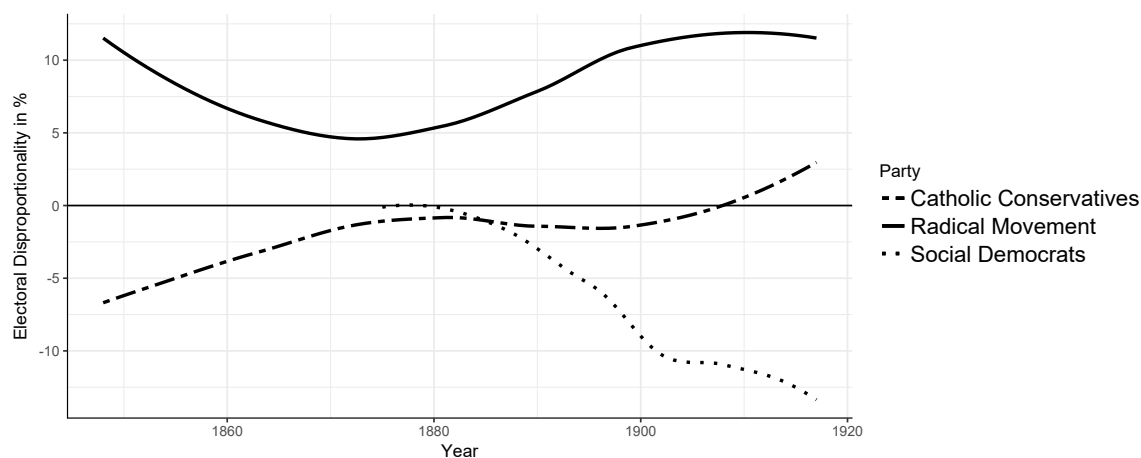
instrument of containment was thus somewhat limited in the case of the Catholic Conservatives. Over time, the Radicals therefore opted to integrate – rather than exclude – the Catholic Conservatives (Bolliger & Zürcher, 2004).

With the emergence of the working class movement towards the end of the 19<sup>th</sup> century (and the political moderation of the Catholic Conservatives), the radical movement's attention turned to the newly created Social Democratic Party. Unlike the Catholic Conservatives, the Social Democrats challenged the Radicals in their urban strongholds. The Radicals therefore directed their institutional engineering by means of redistricting now primarily at the Social Democrats, who suffered from electoral disproportionalities that eclipsed even the ones the Catholic Conservatives had suffered in the first decades after 1848 (see Figure 1).

Astonishingly, the Radicals sometimes openly admitted their political reasons for redistricting. For instance, the MP Augustin Keller publicly noted that they adapted the electoral districts to their political needs: "Even if they have to make crooked strokes, ... where there is not enough, a few liberal municipalities will be added, so it cannot go wrong. Where there are too many black [catholic] or red [left] voters, the council will say: let us move them where they do not trouble us" (cited in Gruner, 1978a, p. 323). Unsurprisingly, this misuse of redistricting to protect the radical movement's majority was one of the most important political complaints since the creation of the Swiss federal state in 1848 and among the main reasons why the opposition parties demanded the adoption of PR (Gruner, 1978a; Natsch, 1967, 1972).

Unfortunately, there is little roll call data on the reform of electoral districts. Only the 1881 and 1890 reforms are documented in the parliamentary records. Yet, the available evidence suggests that the parliamentary votes were divided along the expected lines. While the Catholic Conservatives *unanimously* opposed the two district reforms, the Radicals supported the reforms overwhelmingly. The Social Democrats had no representatives in the national parliament before 1890.

Figure 1: Electoral Disproportionality by Main Parties in Elections to the National Council, 1848-1917 (smoothed)



Source: Gruner (1978b, pp. 398, 418–424). The figure displays the disproportionality of the electoral system by party, i.e. the seat share minus the electoral potential. A plot with the raw data can be found in the appendix (see Figure A1). The Radical Movement includes the Radical Party and its close allies, the Democratic Party and the Liberal Party.

In the appendix, we provide extensive evidence to support our argument about the strategic use of redistricting to contain insurgent parties. Section 2.1 describes the redistricting process. Section 2.2 shows that the probability of redistricting increased with the Social Democrats’ vote share and was biased against the Social Democrats. Put differently, redistricting tended to increase – rather than reduce – the bias. In addition, we provide qualitative evidence on the process of partisan redistricting in the cantons Lucerne and Zurich (including district maps). In both cases, the Radicals managed to contain their political opponents by means of gerrymandering.

Hence, from the point of view of electoral disproportionalities, the radical movement (established party, the main beneficiaries) and the Social Democrats (insurgent party, the main losers) had a clear position with regard to PR. In contrast, the Catholic Conservatives faced mixed incentives. Benefiting from a geographically concentrated voter base and often unchallenged by social democratic insurgents in their mostly rural strongholds, we could expect them to support MR (Boix, 2010). However, given their own painful experience with the Radicals’ electoral engineering by means of redistricting, the Catholic Conservatives also had an interest in breaking the Radicals’

political dominance.<sup>14</sup>

These considerations have important implications. In Switzerland, under MR, the radical movement contained the socialist electoral threat at the district level by partisan redistricting, which, however, resulted in growing electoral disproportionalities. The electoral potential of the Social Democratic Party as well as the degree of electoral disproportionality due to defensive redistricting are therefore indicators of how much the radical movement had to lose from the adoption of PR. The higher the electoral potential of the Social Democratic Party and the higher the degree of electoral disproportionality in the Social Democrats' disfavor, the more likely radical MPs would lose their seats in elections under PR rules and thus the stronger the radical MPs' support for MR.

## Data and method

The theoretical literature on the adoption of PR in democratic countries in the early 20<sup>th</sup> century is rich. Empirically, however, the debate has been inconclusive (Blais et al., 2004; Cusack et al., 2007; Emmenegger & Petersen, 2017; Kreuzer, 2010). This is not surprising. The quantitative macro-comparative analysis of what is ultimately a single event in a small sample of countries is a rather weak research design. Leemann and Mares (2014) therefore suggest that researchers focus on electoral district-level data and the corresponding legislators' voting behavior in parliament. Using data on a July 1918 vote on electoral system reform in the German Reichstag, they show that the legislators' vulnerability to the rise of socialist competitors within their electoral district and electoral disproportionalities at the partisan level have considerable explanatory power. However, as discussed above, with the 1918 German vote, Leemann and Mares (2014) look at a rather special case, because the German MPs were elected in single-member districts, whose boundaries could not be adapted for political rea-

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<sup>14</sup>The Catholic Conservatives also hoped to benefit from the adoption of PR because the increasing number of diaspora Catholics might have allowed them to win seats in Protestant areas.



sons. Yet, as Colomer (2007) shows, multi-member districts were common before the adoption of PR and so was the manipulation of electoral district boundaries for political reasons (see Table A6 in the appendix).

There is a further problem with the analysis of Leemann and Mares (2014). As Schröder and Manow (2018, pp. 9–10) observe, the July 1918 Reichstag vote affected only 26 of the then 387 electoral districts. The other 361 remained single-member districts, where PR and MR essentially lead to the same outcome. In addition, only five of the new districts were of a magnitude that could be referred to as "PR in small districts", i.e. with at least four seats (Carey & Hix, 2011, p. 393). Put differently, although the July 1918 reform introduced some elements of PR, the mean and median of seats per district were only 1.1 and 1.0 respectively. Therefore, Schröder and Manow (2018) argue, the introduction of PR in Germany should be dated at November 1918, when the revolutionary Council of the People's Deputies by simple decree prescribed PR for the next elections.

We follow Leemann and Mares (2014) and examine the voting behavior of members of parliament. However, we focus on the Swiss case, which offers a series of advantages over the German one. Most importantly, the new electoral system adopted in 1918 was considerably more proportional than the German one. In the Swiss case, the new electoral system had a mean and median district magnitude of 8.0 and 6.0 respectively. In addition, the new electoral system, which is still in effect today, was adopted in – compared to Germany – less extreme political circumstances, as Switzerland was not involved in World War 1 (let alone facing defeat). Finally, Switzerland's majority run-off system in multi-member districts with 'flexible' electoral district boundaries offers particularly fruitful conditions to test the argument that redistricting under MR can be a powerful alternative to the adoption of PR.

In order to examine MP support for PR in Switzerland (our dependent variable), we have created a novel data set covering a large range of variables. For theoretical reasons, which we outline below, the data are collected at three different levels: the

individual legislators, the electoral district, and the canton. Summary statistics and data sources of all variables are provided in the appendix.

Our dependent variable is the support for the introduction of PR by a member of the National Council (lower chamber) in four votes in 1900, 1910, 1914, and 1918 (each time voting on virtually identical proposals).<sup>15</sup> In all votes, proportional representation was rejected by yes/no ratios of 33/79 in 1900, 45/100 in 1910, 62/105 in 1914, and 71/78 in 1918 (Amtliches Stenographisches Bulletin der Schweizerischen Bundesversammlung 1900, 1910, 1914, 1918).<sup>16</sup>

In order to examine our theoretical propositions, we have engaged in extensive data collection on electoral outcomes in four elections for the national council in 1899, 1908, 1911, and 1917. We have coded the results of 1'224 candidates, of which 624 were successfully elected in up to 52 electoral districts (based on Gruner, 1978b). The data were then matched with the voting results on the adoption of PR in the National Council in 1900, 1911, 1914, and 1918 from the "Amtliches Stenographisches Bulletin der Schweizerischen Bundesversammlung." Finally, we have complemented this data with a number of characteristics of the individual legislators, their electoral districts, and their cantons.

The existence of multi-member districts with 'flexible' electoral district boundaries makes the calculation of electoral disproportionalities and social democratic electoral strength difficult. Since multi-member districts with run-offs incentivize the creation of district-level electoral alliances between parties (Sartori, 1994), the vote share of a

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<sup>15</sup>In each case, the proposals simply stated that the elections to the lower chamber are direct, based on the principle of proportionality, and that cantons are the electoral districts.

<sup>16</sup>Hence, Switzerland did not adopt PR by an act of parliament. In all four cases, the radical movement defeated the proposal. Instead, the adoption of PR was put to a popular vote in October 1918 and was accepted by a majority of the voting population (Lutz, 2004). In 1891, Switzerland had introduced the instrument of popular initiatives, which require support of at least 50'000 citizens and allow suggesting constitutional articles that need to be implemented by law if approved in a popular vote (parliament cannot adapt the proposals). However, this fact has no negative consequences for our analysis. In each of the four votes, there is a sizable minority supporting the adoption of PR. We have therefore sufficient variation to analyze. In addition, the hypotheses we analyze in the empirical part profess to explain the variation in MP voting behavior and not the ultimate outcome.

party can overestimate the actual electoral strength considerably, because voter preferences are not necessarily expressed by party but by alliance (Gruner, 1978a, pp. 58–71). In addition, redistricting for political reasons is likely to lead to an underestimation of some of the parties' electoral strength if measured by effective vote shares at the district level due to strategic voting (Cox, 1997). As outlined above, the Radicals employed redistricting extensively against the Catholic Conservatives and, later, against the Social Democrats in order to protect their parliamentary majority.

We address these measurement problems by relying on an indicator of the parties' *electoral potential* at the cantonal level (based on Gruner, 1978b, pp. 373–397). We expect parties to evaluate the status quo against their seat to vote relation under PR. Given that cantonal borders constituted legal barriers to redistricting under MR and were the expected districts under any PR system (see footnote 13), the parties' electoral potential at the cantonal level – and not their vote share at the district level – is a more valid indicator of the Social Democrats' electoral strength and thus the MPs' position vis-à-vis PR.<sup>17</sup> Gruner's electoral potential data has the additional advantage that it compensates for district-level electoral alliances and voters not using all of their votes. Based on this data, he shows, for instance, that in the canton Zurich in 1908 (consisting of four electoral districts), the Social Democratic Party managed to gain only two out of 22 seats despite an electoral potential of 35.3 percent (at the cantonal level). All but three of the twenty seats won by the radical movement were protected by means of district-level electoral alliances. What is more, the canton Zurich was notorious for redistricting for political reasons (Kummer, 1969).<sup>18</sup>

In addition, based on the electoral potential data, we calculate the degree of electoral disproportionality at the cantonal level by party (seat share minus electoral potential). Importantly, we argue that the degree of electoral disproportionality and the social

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<sup>17</sup>Of course, we also examine the effect of district-level vote shares on MP voting behavior (see model 1 in Table A13 and Table A14 in the appendix).

<sup>18</sup>See section 4 in the appendix for a detailed explanation of how the parties' electoral potential at the cantonal level is calculated. Although strategic voting remains a concern with Gruner's electoral potential data, as in all electoral studies, his data proves to be an excellent predictor of election outcomes under PR (see section 4 in the appendix).

democratic electoral potential at the cantonal level amplify each other. Given that redistricting in response to a social democratic electoral threat also increases electoral disproportionality, we expect an interactive effect between the degree of electoral disproportionality and social democratic electoral potential on MP voting behavior.<sup>19</sup>

We control for a series of alternative explanations. We measure whether MPs were elected in the first, second, or third round. As Leemann and Mares (2014) have argued, run-off elections indicate a higher electoral vulnerability of individual MPs, which, in turn, should lead to a higher propensity to support PR. In addition, we incorporate data on party elites, because party elites might develop an interest in PR to increase voting cohesion within their parliamentary group (Cox, Fiva, & Smith, 2019; Schröder & Manow, 2018). Therefore, we measure whether an MP is a leader of a party or parliamentary group. We have also collected data for multiple competition and coordination indicators, namely the vote margin of the two strongest, non-social democratic parties, the number of parties, and district magnitude (Boix, 1999; Leemann & Mares, 2014). Furthermore, we measure whether a canton had already adopted PR for cantonal elections in order to investigate whether the experience with PR in sub-national elections affects the MPs' willingness to support PR.

In addition, we have collected a number of additional socio-economic and political indicators at the district and cantonal level. First, following Leemann and Mares (2014), we measure co-specific assets as the number of people attending vocational training as a fraction of the population. Based on Cusack et al. (2007), we expect MPs to support the adoption of PR when their interest in regulatory frameworks protecting co-specific investments outweighs their opposition to the likely redistributive consequences. Second, we investigate the link between trade exposure and the adoption of PR by measuring the size of the trade sector as the number of workers in the export-

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<sup>19</sup>Social democratic electoral potential and the degree of electoral disproportionality are thus related in the case of social democratic MPs (although not perfectly because the social democratic electoral *potential* is less affected by redistricting decisions). Yet, since there are only few social democratic MPs (less than eight percent of the sample), the two variables are almost entirely independent of each other. Nevertheless, it is important to note that our results hold when the social democratic MPs are omitted from the analysis (see Table A13 in the appendix).

oriented industries in the economy, weighted by the total work force. According to Rogowski (1987), there is a natural affinity between trade exposure and proportional electoral systems. In the Swiss case, we assigned the textile, chemistry, and metal and machinery industries to the export sector (Veyrassat, 2012, p. 52). Third, in order to proxy the social democratic radicalization, and thus the existential threat posed by the Social Democrats (Ahmed, 2013), we employ measures of the number of strikes and the number of strike participants per 10'000 inhabitants in the period 1880-1914.<sup>20</sup> Finally, we control for the level of economic development with a dummy variable for urbanization (did the district have a city with more than 10'000 inhabitants?) and the share of the agricultural work force.

## Empirical results

Table 2 displays our main results for the different hypotheses outlined above. We use logit regressions for binary outcomes. In addition, standard errors are clustered by party to account for the non-independence of different MPs from the same party. Since cluster robust standard errors are argued to perform poorly in settings with few clusters, we also provide estimations using linear probability models with wild cluster bootstrap standard errors in Table A7 in the appendix (Cameron, Gelbach, & Miller, 2008). Moreover, we employ year and district fixed effects to rule out that our results are driven by unobserved heterogeneity in the specific votes or electoral districts.<sup>21</sup>

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<sup>20</sup>Even though the national Social Democratic Party had formally adopted Marxism in 1904, cantonal parties continued to display different ideological positions (Gruner, 1988, pp. 383–395). Given that cantonal parties select candidates for national elections, we are confident that Ahmed's radicalization thesis can be tested in a single country setting.

<sup>21</sup>We refrain from using multilevel models for a number of reasons. First, simulation studies have shown that frequentist and bayesian approaches can perform poorly if the number of level 2 units or clusters is small (Stegmueller, 2013). While we employ wild cluster bootstrap standard errors to achieve more conservative tests, similar solutions are not available for multilevel models. Second, multilevel models are more demanding and based on additional assumptions (Steenbergen & Jones, 2002). In settings with a low number of clusters, multilevel modeling is thus unlikely to yield any advantage compared to classical methods (Gelman & Hill, 2007, p. 247). Therefore, we employ cluster robust standard errors to obtain more conservative tests of our hypotheses.

We start discussing our results by including social democratic electoral potential as well as the degree of electoral disproportionality by party at the cantonal level (Model 1 in [Table 2](#)). We include all MPs in the statistical analysis. We find that the degree of electoral disproportionality has a statistically significant negative effect at the 1% level on the probability of supporting PR. Hence, the more MPs benefited from electoral disproportionalities, the less likely the MPs were to support the adoption of PR.

In addition, Model 1 shows that the legislators' vulnerability to the rise of socialist competitors decreases their support for PR. Yet, as expected, the coefficient is not significantly different from zero, because the effect of social democratic electoral potential is conditional on electoral disproportionalities. Removing the social democratic MPs from the analysis points to this conditional effect. The social democratic MPs (who typically supported PR) were particularly disadvantaged by electoral disproportionalities (see [Figure 1](#)). At the same time, the Social Democrats won seats only in electoral districts in which they were electorally strong. If they are excluded from the analysis, the effect of social democratic electoral potential becomes significant at the 1% level (see Model 2 in [Table A13](#) in the appendix), because most MPs now left in the analysis are benefiting from electoral disproportionalities.

Model 2 in [Table 2](#), again including all MPs, shows this interaction between electoral disproportionalities and social democratic electoral potential more directly. In the theory section, we have argued that electoral disproportionalities are to some extent the result of the radical movement's strategy to contain the Social Democrats by means of redistricting. If this containment strategy is used successfully, we should expect the established parties' MPs to support MR. However, if this strategy failed or electoral disproportionalities even benefit the insurgent party, the established parties' MPs are expected to support PR.<sup>22</sup> Importantly, as explained in the theory section, social democratic MPs are expected to behave similarly – albeit for different reasons.

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<sup>22</sup>Or to put this relationship differently, the negative effect of electoral disproportionality (i.e. the importance of redistricting as a containment strategy) should be amplified if MPs are confronted with a strong Social Democratic Party (in terms of electoral potential at the cantonal level).

These (few) MPs typically made it to parliament despite the established parties' best efforts to exclude them. Moving to PR would thus greatly benefit them, because it would allow them to translate their large electoral potential into more seats. All models in [Table 2](#) therefore include all MPs. Yet, our results hold when the social democratic MPs are omitted from the analysis (see [Table A13](#) in the appendix).

Indeed, the interaction term employed in Model 2 in [Table 2](#) confirms our expectation. The negative sign of the interaction term indicates that the negative effect of social democratic electoral potential becomes larger with increasing electoral disproportionalities (and vice versa). Both constitutive terms of the interaction are not statistically significant, which suggests that the social democratic electoral potential has no effect on the voting decision of an individual MP in favor or against PR when there are no relevant electoral disproportionalities (Brambor, Clark, & Golder, 2006). This finding is consistent with our theoretical argument. However, as the social democratic electoral potential increases, MPs of established parties increasingly resort to partisan redistricting to contain the social democratic electoral threat, which results in large electoral disproportionalities. In this situation, MPs of established parties develop a strong interest in supporting MR.

Before turning to the substantive interpretation of the interaction term, we demonstrate that our interaction is robust to a large number of model specifications. In Model 3-7, we account for a number of confounders that relate to economic explanations, the electoral process and the radicalization of the Social Democrats. In particular, we include indicators of co-specific assets and trade exposure in Models 3 and 4 (Cusack et al., 2007; Rogowski, 1987). In Model 5, we add multiple measures for characteristics of the electoral process such as whether a MP was elected in the run-off, in a competitive race among established parties (Leemann & Mares, 2014), or was a member of the party elite (Cox et al., 2019; Schröder & Manow, 2018).<sup>23</sup> In Models 6 and 7, we employ a strike measure (number of strikes in a district) to

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<sup>23</sup>The coefficient for MPs elected in the third run is even negative and significant. However, only three MPs (out of 624) were elected in this way, because the third run was abolished in 1900.

Table 2: Pooled Logit Models on PR Votes

	<i>Dependent variable:</i>							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Electoral Dispro. Canton	-7.914*** (0.953)	-2.124 (1.773)	-2.129 (1.692)	-2.179 (1.825)	-2.404 (1.569)	-2.171 (1.676)	-2.241 (1.636)	-1.652 (1.589)
Soc. Dem. Electoral Potential	-0.031 (0.025)	-0.003 (0.025)	-0.003 (0.023)	-0.006 (0.028)	-0.004 (0.023)	-0.014 (0.025)	-0.023 (0.030)	-0.008 (0.035)
Elec. Dispro.*Soc. Dem.		-0.474*** (0.126)	-0.474*** (0.124)	-0.461*** (0.129)	-0.461*** (0.121)	-0.450*** (0.089)	-0.458*** (0.118)	-0.708*** (0.115)
Co-Specific Assets			0.883 (16.781)			-16.050 (11.514)	-9.119 (13.238)	-19.437 (19.121)
Trade				0.694 (1.160)		0.862 (1.128)	0.988 (1.126)	-1.661 (3.317)
Second Round Voting					0.726 (0.518)	0.623*** (0.234)	0.791* (0.420)	0.055 (0.518)
Third Round Voting					-12.575*** (0.811)	-12.720*** (0.868)	-12.409*** (0.754)	-17.509*** (0.761)
Right Margin					0.050 (0.418)	0.085 (0.285)	0.001 (0.295)	-0.791 (0.635)
Party Elite					0.480 (0.513)	0.551 (0.412)	0.513 (0.418)	1.069*** (0.397)
Soc. Dem. Seat Dis.						-0.168 (1.007)		
Number of Strikes						-0.001 (0.002)	-0.002 (0.001)	-0.006* (0.004)
Soc. Seat*Num. Strikes						0.008 (0.005)		
Soc. Dem.*Num. Strikes							0.0001 (0.0001)	0.0002 (0.0002)
Constant	0.028 (1.319)	-0.321 (1.243)	-0.322 (1.252)	-0.454 (1.121)	-0.378 (1.113)	-0.446 (1.119)	-0.385 (1.046)	-1.747** (0.842)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	No	No	No	No	No	No	No	Yes
Observations	547	547	547	547	547	547	547	547
Akaike Inf. Crit.	601.667	553.645	555.639	554.885	556.822	555.507	558.996	503.828

Note: Cluster Robust Standard Errors by Party. \* p<0.1; \*\* p<0.05; \*\*\* p<0.01



measure social democratic ideological radicalization.<sup>24</sup> We interact strikes with social democratic electoral potential (Model 6) and whether a Social Democrat was elected in a district (Model 7) to capture the "existential threat", i.e. the permanent presence of an ideologically radicalized Social Democratic Party (Ahmed, 2013). Overall, the results provide only evidence for the party elite argument, meaning that party leaders were more likely to support PR than backbenchers. Lastly, we add district fixed effects, which provide additional evidence that our main interaction is robust.<sup>25</sup> In all cases, the inclusion of control variables and fixed effects does not affect the relationship between the degree of electoral disproportionality, social democratic electoral potential, and support for PR.

We now turn to the visual interpretation of the interaction effect between electoral disproportionality and social democratic electoral potential at the cantonal level. In [Figure 2](#) and [Figure 3](#), we plot the predicted probabilities with the 95% confidence intervals for three selected scenarios using the estimates of Model 7 in [Table 2](#) with all control variables at their mean.<sup>26</sup> In addition, we provide histograms (bottom right plots) to show that the scenarios are representative with regard to both social democratic electoral potential (see [Figure 2](#)) and electoral disproportionalities (see [Figure 3](#)).

Starting with the predicted probabilities for the degree of electoral disproportionality in [Figure 2](#), the upper left plot provides evidence that electoral disproportionalities have essentially no effect on MPs' voting behavior in the absence of a relevant social democratic challenger at the cantonal level. However, the picture changes quite drastically when the Social Democrats enter the electoral arena. With a social democratic electoral potential of 20% (upper right plot), the probability of MPs supporting PR

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<sup>24</sup>Capturing radicalization as strike participants per 10'000 inhabitants leads to the same conclusion, see [Table A8](#) in the appendix.

<sup>25</sup>Further robustness tests can be found in the appendix. [Table A8](#) in the appendix displays our estimates employing a number of additional control variables related to political competition, economic development, and the radicalization of the left. In addition, we provide evidence in the appendix that our specification holds across votes by estimating our main models separately for 1900 ([Table A9](#)), 1910 ([Table A10](#)), 1914 ([Table A11](#)), and 1918 ([Table A12](#)).

<sup>26</sup>Using our specification with district fixed effects for the predicted probabilities yields similar results.

drops below 50% if they have only a very small benefit from the existing electoral system. The same is true for a social democratic electoral potential of 40% (bottom left plot), but here the drop in support for PR is even more drastic, reaching a probability of almost zero for disproportionality scores over 25%.<sup>27</sup> Put differently, [Figure 2](#) indicates that the staunchest supporters of MR are MPs who owe their seats to electoral disproportionalities and face credible competition from insurgent party candidates.

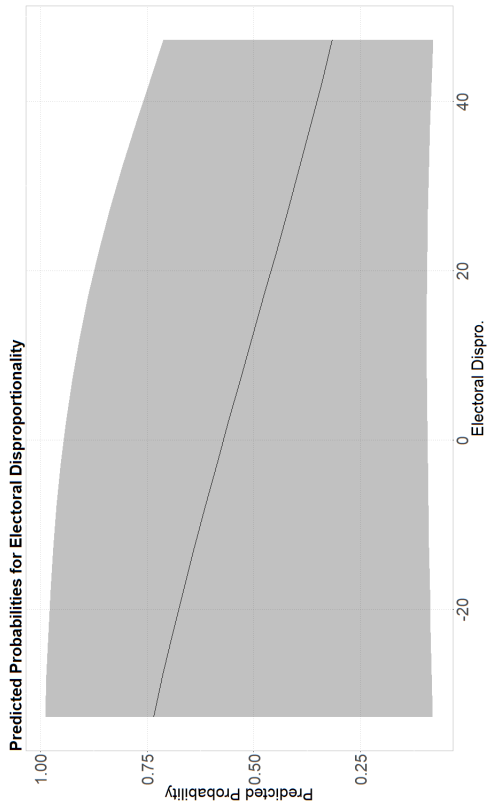
Turning to the effect of social democratic electoral potential in [Figure 3](#), we find that the probability to support PR is conditional on electoral disproportionalities. When MPs do *not* benefit from the existing electoral system (electoral disproportionality of minus 20%, upper left plot), support for PR increases with social democratic electoral potential. This is the familiar electoral threat thesis, as suggested by Boix (1999). Yet, as MPs increasingly benefit from the electoral system (as expressed in electoral disproportionalities), the relationship changes. For a disproportionality score of 10%, support for PR *decreases* with increasing social democratic electoral potential (upper right plot). While the effect is not significant if MPs benefit only weakly from the existing electoral system, the result changes for higher degrees of electoral disproportionality. For a disproportionality score of 40%, the probability of MPs to vote for PR declines to less than 1.5% when the social democratic electoral potential reaches 20% (see bottom left plot). [Figure 3](#) thus shows that support for MR *increases* with the insurgent party's electoral potential if established parties have opted for partisan redistricting as their containment strategy.

## Conclusion

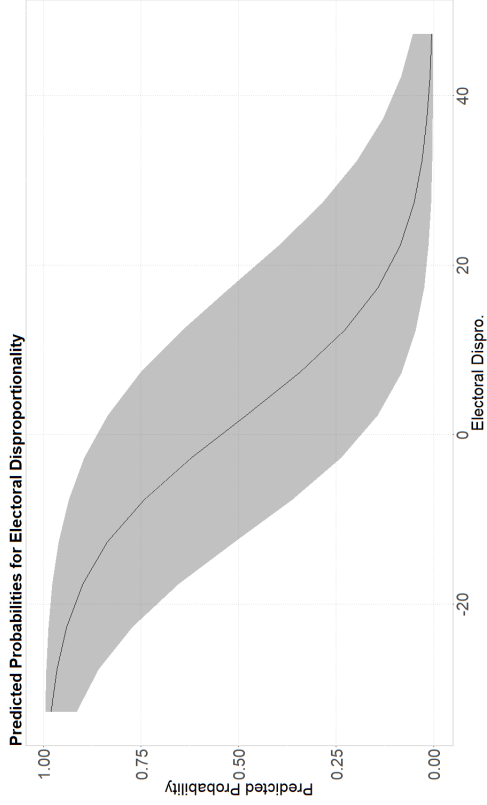
Our analysis of four Swiss parliamentary votes on the adoption of PR shows that both distortions in the allocation of electoral potential to seats as well as social democratic electoral potential at the cantonal level are important determinants of MP voting be-

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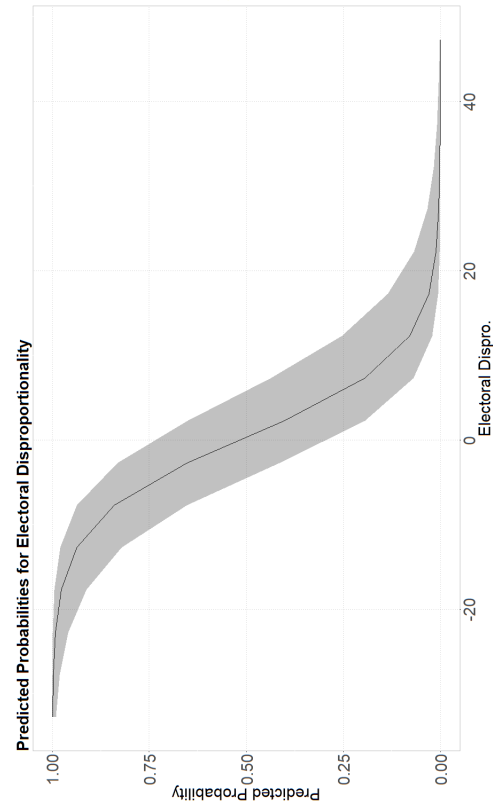
<sup>27</sup>Let us emphasize one more time that the effect holds despite the inclusion of the social democratic MPs in our sample. Removing the social democratic MPs from the sample does not affect the observed relationship substantively (see [Table A13](#) in the appendix).



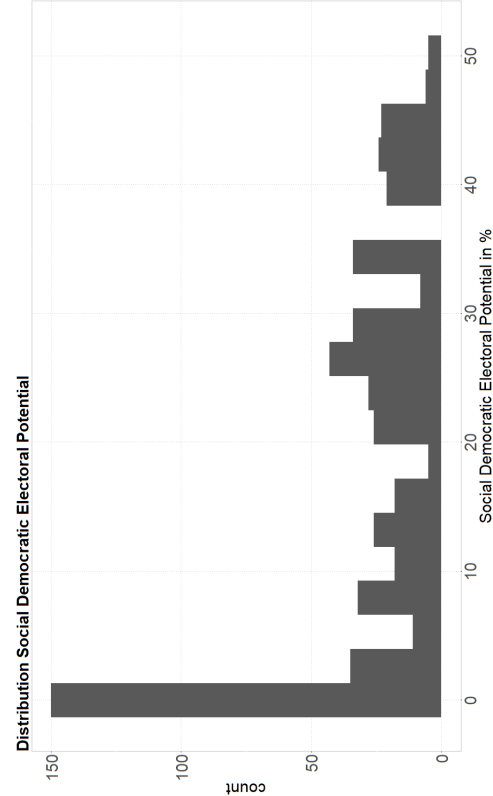
(a) Social Democratic Electoral Potential 0%



(b) Social Democratic Electoral Potential 20%



(c) Social Democratic Electoral Potential 40%



(d) Histogram Social Democratic Electoral Potential %

Figure 2: Varying Impact of Disproportionality

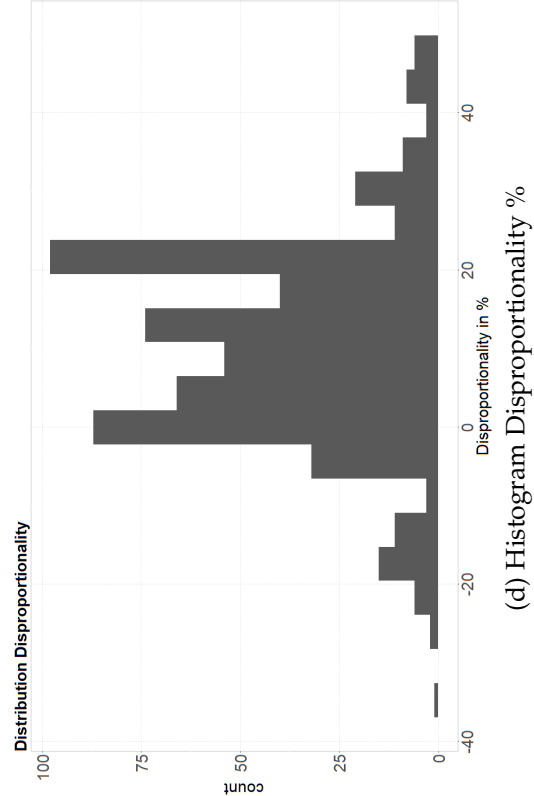
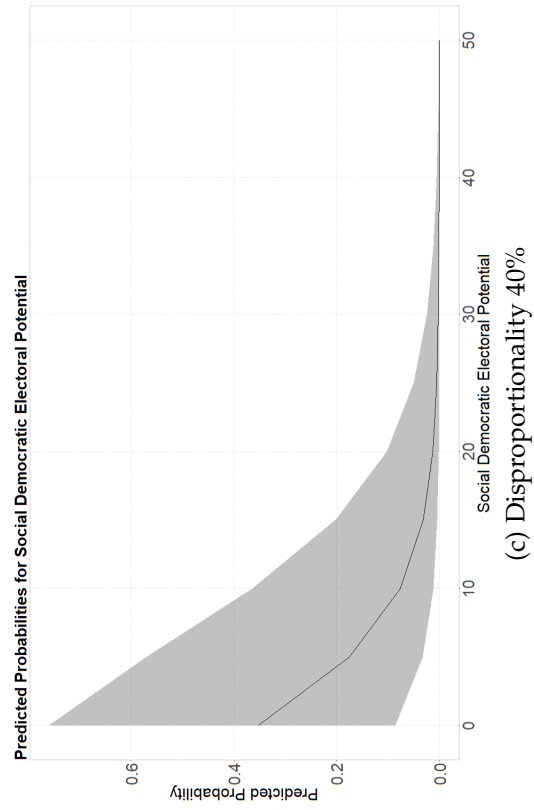
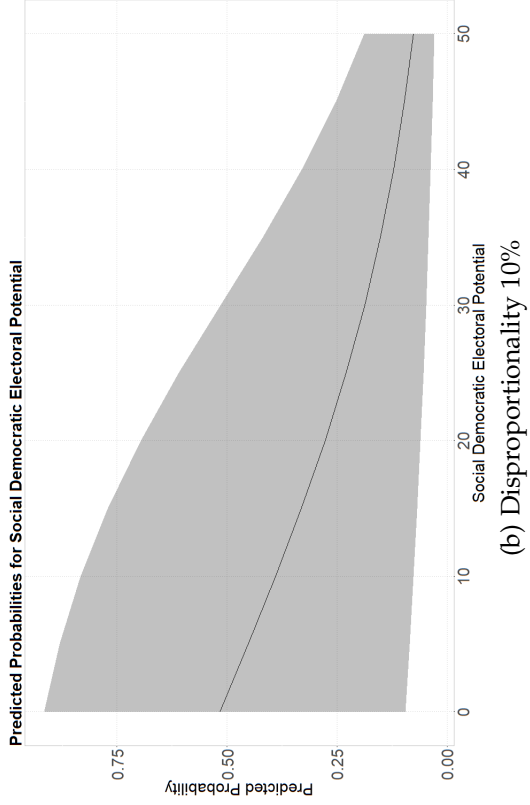
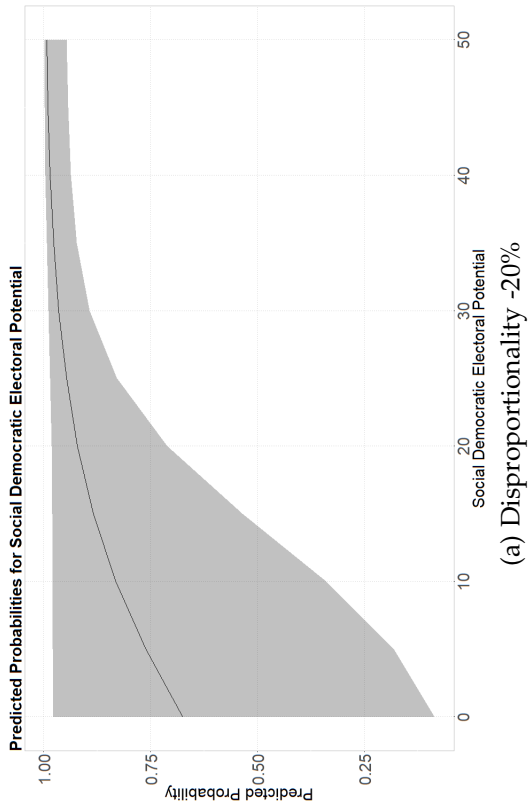


Figure 3: Varying Impact of Social Democratic Electoral Potential

havior. We find that the more MPs benefited from the existing electoral system in terms of electoral disproportionalities, the more likely they opposed the adoption of PR. However, in stark contrast to the standard formulation of the electoral threat thesis, our analysis shows that increasing social democratic electoral potential did not increase the probability that MPs of established parties supported PR. Rather, we show that MPs' resistance to PR increased with social democratic electoral potential. Moreover, we observe an interaction effect between the degree of electoral disproportionality and social democratic electoral potential. *Ceteris paribus*, the negative effect of social democratic electoral potential is amplified for high levels of electoral disproportionality.

The reason for this relationship can be found in redistricting, whose relevance the literature on the adoption of PR has so far largely ignored (but see Ahmed, 2013). Adapting electoral district boundaries for political reasons, if possible in a given institutional context, is an important alternative to PR, because it allows established parties to retain solid parliamentary majorities even as the insurgent party's electoral potential increases. Yet, partisan redistricting is predicated on maintaining control over the relevant decision-making body in charge of redistricting and is influenced by electoral geography. In addition, redistricting is primarily effective under MR. Once countries adopt PR, redistricting loses much of its effectiveness. Finally, this containment strategy leads to considerable distortions in the allocation of electoral potential to seats. As a consequence, the higher the insurgent party's electoral potential and the wider the degree of electoral disproportionality, the more the established parties' MPs have to lose from adopting PR.

Our findings demonstrate the importance of examining hypotheses about strategic political behavior in the concrete historical and institutional context. Switzerland's majority run-off system in multi-member districts with 'flexible' electoral district boundaries was, unlike the German system analyzed by Leemann and Mares (2014), particularly conducive to a containment strategy based on redistricting. If not for the

possibility to adapt electoral district boundaries for political reasons, i.e. gerrymandering, Switzerland's established parties, like their German peers, would have seen much more benefit in adopting PR. These reflections suggest that the adoption of PR becomes a serious alternative only once redistricting ceases to be a viable option – either because the potential of partisan redistricting has been exhausted or, more likely, because the established parties have lost political control over the redistricting process.

The Swiss electoral system before the adoption of PR was not unusual. Rather, MR systems with multi-member districts were quite common in the late 19<sup>th</sup> and early 20<sup>th</sup> century (Colomer, 2007). In addition, partisan redistricting continues to be widespread – in particular in MR systems (Magar, Trelles, Altman, & McDonald, 2017; Martinez i Coma & Lago, 2018; Samuels & Snyder, 2001) and electoral autocracies (Birch, 2011; Wong, 2017). Consider for instance how the ruling UMNO party in Malaysia used partisan redistricting to contain the emerging PAS party in the late 1990s (Ziblatt & Levitsky, 2018, p. 88). In contrast, PR systems leave established parties with relatively few instruments to contain insurgent parties – including anti-system parties that aim to undermine liberal democracy from within.

There is little reason to believe that politicians were less willing to take advantage of redistricting in earlier periods. What may differ is the extent to which MR systems allow political parties to capture the process of redrawing electoral districts. A large and sophisticated literature focusing mostly on the USA has examined gerrymandering in earlier decades (e.g. Cox & Katz, 2002; Engstrom, 2013). Unfortunately, however, research has paid less attention to redistricting in other countries, making it "the most neglected topic in electoral and institutional design in terms of comparative research" (Handley & Grofman, 2008, p. v). Nevertheless, Table A6 in the appendix provides some preliminary evidence that in the early 20<sup>th</sup> century, political (rather than neutral) bodies were often in charge of redistricting and that redistricting was a widely used containment strategy. For instance, the process of redistricting was

clearly politicized in diverse countries such the Austrian Empire, Canada, France, New Zealand, the United Kingdom, and the USA. Hence, the practice of redrawing district lines to achieve partisan advantages was clearly widespread in the early 20<sup>th</sup> centuries. Yet, more comparative and historical research is needed to examine the origins and effects of gerrymandering (Samuels & Snyder, 2001).

Ultimately, Switzerland did not introduce PR by an act of parliament. In all four parliamentary votes on the adoption of PR, the established parties managed to defeat the proposal. Instead, the proposal to introduce PR was put to a popular vote in October 1918 and, despite massive mobilization efforts of the Radical Party and its political allies, was accepted by a majority of the voting population (Lutz, 2004). However, this resort to direct democracy is by no means another case of "Swiss exceptionalism." Rather, it reflects the biggest challenge of arguments based on Rokkan's (2009) second road to PR, namely the question of why the advantaged parties did not resort to redistricting and other forms of electoral engineering to protect their privileged position. While these accounts can convincingly explain parties' position toward PR, they fail to explain how the disadvantaged parties were able to overcome the advantaged parties' resistance.

In the Swiss case, the disadvantaged parties could request a popular vote, where the established parties' possibilities to manipulate the result were rather restricted. We suspect that in other countries, the advantaged parties' resistance might have similarly been broken by procedures and events outside of the election system and thus not subject to the possibility of electoral engineering. A rather straightforward possibility is military conflict, which forced established parties to compromise with the political opposition or even removed some of the established parties altogether. The clustering of transitions to PR in the immediate postwar years might thus be no coincidence. Rather, it might reflect that geopolitical developments had opened a window of reform for disadvantaged parties to extract the desired reform. A focus on electoral engineering might thus lead to a reevaluation of the temporal clustering

of these reforms.

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# Appendix

This online appendix contains additional material for the manuscript “Disproportional Threat: Redistricting as an Alternative to Proportional Representation.”

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# 1 Descriptives and summary statistics

In this section, we provide the raw data for electoral disproportionality by main parties in the period 1848-1918 (see [Figure A1](#)), the variable descriptions and sources (see [Table A3](#)), and the summary statistics (see [Table A4](#)).

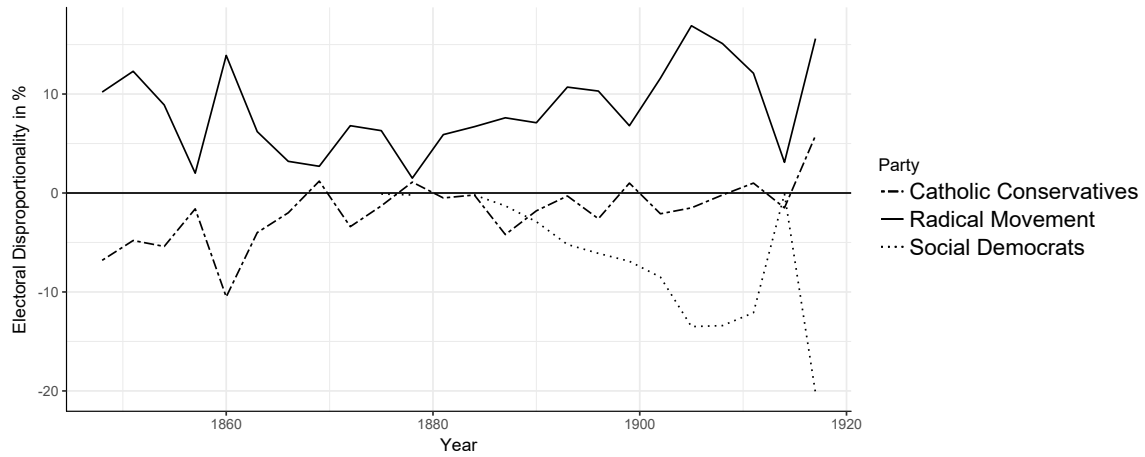


Figure A1: Electoral Disproportionality by Main Parties 1848-1917 (raw data)

Table A3: Variable Descriptions & Sources

Variable	Description	Source
PR Vote	The vote of the individual Legislator on PR	Amtlisches Stenographisches Bulletin der Schweizerischen Bundesversammlung (various years)
Round of Voting	Whether the individual MP was elected in the first, second or third round	Gruner (1978b)
Coalition w. Soc. Dem.	Whether MP was supported by the Social Democratic Party during the election	Gruner (1978b)
Coalition w./o. Soc. Dem.	The number of non-socialist parties that supported a MP in the election	Gruner (1978b)
Electoral Dispro.	A party's cantonal seat share subtracted by its electoral potential	Gruner (1978b)
Soc. Dem. Electoral Potential	The cantonal electoral potential of the Social Democratic Party	Gruner (1978b)
Right Margin	The vote margin of the two strongest non-socialist parties	Gruner (1978b)
Number of Parties	The number of parties competing in the first round	Gruner (1978b)
Number of Seats	District magnitude	Gruner (1978b)
Urbanization	Whether a district has a city with more than 10'000 inhabitants	Eidgenössische Volkszählung (various years)
Strikes	The number of strikes per 10'000 inhabitants	Hirter (1988)
Strike Participation	The number of strike participants per 10'000 inhabitants	Hirter (1988)
Trade Sector	The size of work force in export-oriented industries as fraction of total work force	Eidgenössische Volkszählung (various years)
Agricult. Work. Share	The size of the work force in the first sector as fraction of total work force	Eidgenössische Volkszählung (various years)
Skills	The number of people attending vocational education as fraction of the population	Jahrbuch des Unterrichtswezens in der Schweiz (various years)
PR in Canton	Whether PR is used for cantonal parliamentary elections	Funk and Gathmann (2013)
Party Elites	Dummy variable capturing whether a MP is leader of party or parliamentary group	Historical Lexicon of Switzerland
Compulsory Voting	Whether compulsory voting (with sanctions) does exist in a canton	Bechtel, Hangartner, and Schmid (2016, appendix)
Direct Democracy	Index capturing the number of direct democratic instruments and the economic costs associated with their use	Leemann (2018)

Table A4: Summary Statistics

Variable	Obs.	Mean	St. Dev.	Min.	Max.
<b>MP</b>					
PR Vote	555	0.37	0.48	0.00	1.00
Round of Voting	626	1.11	0.33	1.00	3.00
Coal. w. Soc. Dem.	626	0.08	0.27	0.00	1.00
Coal. w/o Soc. Dem.	626	1.53	0.78	1.00	5.00
<b>District</b>					
Right Margin	626	0.55	0.39	0.00	1.00
Number Parties	626	2.54	1.18	1.00	6.00
Number Seats	626	3.98	1.99	1.00	9.00
Urbanization Dummy	626	0.50	0.50	0.00	1.00
Number of Strikes	626	115.11	119.71	0.00	425.00
Strike Participation	626	1265.79	1365.83	0.00	5372.00
Trade Sector	626	0.21	0.13	0.01	0.55
Agricul. Work. Share	626	0.29	0.17	0.01	0.73
<b>Canton</b>					
Electoral Dispro.	617	0.10	0.13	-0.33	0.50
Soc. Dem. Electoral Potential	626	16.52	15.26	0.00	50.30
Co-Specific Assets	626	0.02	0.02	0.00	0.07
PR Canton	626	0.31	0.46	0.00	1.00



## 2 The Political Use of Redistricting in Switzerland

In this section, we discuss the redistricting process in Switzerland. First, we describe the redistricting process and provide some key figures (section 2.1). Second, we forward evidence that the probability of redistricting increases with the Social Democrats' vote share and that redistricting is associated with increasing disproportionality for the Social Democrats (section 2.2). Third, we provide qualitative evidence on the political use of redistricting by adding two short case studies on the parliamentary debates on the issue of redistricting (including district maps) in the case of the cantons Lucerne (section 2.3) and Zurich (section 2.4), which shows that redistricting was used as an instrument to contain insurgent parties. Finally, we provide the sources for our arguments about other cases of gerrymandering in lower house elections at the turn of the century (see [Table A6](#) in section 2.5).

### 2.1 Redistricting for Federal Elections in Switzerland

Before 1918 Switzerland relied on two-round (three-round before 1900) majority run-off system in multi-member districts (with a plurality run-off in the last round) for elections to the national council (the lower chamber of parliament). As a general rule, electoral districts were supposed to receive one seat per approximately 20'000 inhabitants, while the goal was to aim for districts with four seats (Gruner, 1978a, pp. 312–342). Yet, there were important complications. Most notably, the Swiss constitution (art. 73 in the 1874 constitution) made the creation of electoral districts across cantonal borders impossible, which is clearly the result of the strong Swiss tradition of federalism (on the creation of the 1848 constitution and the role of federalism in this process see Holenstein, 2018). However, within cantonal borders, there were no limits to redistricting. Importantly, the federal structure of Switzerland, consisting of (then) 25 cantons, also determined the electoral districts under PR (cf. Gruner, 1978a; Natsch, 1967, 1972). This constitutional rule had important implications. Some of the cantons were very small (but were nonetheless guaranteed at least one seat),

while other cantons could not easily be organized in four-seat districts. Hence, the redistricting rules left much discretion to the political decision-makers. In addition, the number of electoral districts changed constantly. The maximum number of districts was 52 (elections in 1890, 1893, 1896, and 1899). In the last election before the adoption of PR (1917), there were 49 electoral districts. The smallest district had one seat, while the largest district had nine seats (the first district in the city of Zurich in 1908).<sup>28</sup> Following the 1910 national census, the first district in the city of Zurich was supposed to be increased to twelve seats. Yet, this development, as we show below (section 2.4), led to the split of the first district, because the Radicals were increasingly concerned about losing this large district to the Social Democrats.

A key challenge for such electoral systems is unbalanced population growth. In Switzerland, economic development in the 19<sup>th</sup> century was concentrated in the Protestant city-belt stretching from St.Gallen in the East over Zurich, Bern, Basel to Lausanne and Geneva in the West. As a result, numerous Swiss migrated from the more rural (often Catholic) cantons to these (predominantly Protestant) cities. National census data show that by 1920 roughly 25 % of Swiss citizens did not live anymore in their cantons of origin. For instance, the number of seats allocated to the canton Zurich in 1848 amounted to 12. By 1917, this number had increased to 25. In contrast, some other cantons could not increase their number of seats at all (e.g. the Catholic cantons Appenzell Innerrhodes, Nidwalden, Obwalden, and Zug). Electoral districts were adapted in 1850, 1863, 1872, 1881, 1890, 1902, and 1911, each time following a national census.

The recurring redistricting reforms were officially supposed to deal with malapportionment following (unbalanced) population growth. Yet, the ambiguous rules, the constitutional constraints, and most importantly the decision-making process allowed some political parties to use redistricting to achieve political advantages. The districts

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<sup>28</sup>Electoral districts in Switzerland were numbered sequentially across cantons. Hence, the first district of the canton Zurich was at the same time the first district of all of Switzerland. In contrast, the "first" district of the canton Bern in 1850 (the second canton in the sequence of cantons) was nationally referred to as the fifth district.

for the 1848 election were set in the immediate post-civil war period without consideration of the political opposition (see the case study on Lucerne below, section 2.3). From 1850 onward, the task of adapting existing and creating new electoral districts was assigned to the Swiss parliament and decided by simple majority. Given the fact that the Radicals and their political allies controlled an absolute majority of seats in the Swiss parliament from 1848 to 1917, they were essentially free in designing electoral districts to their advantage. The resulting electoral disproportionalities are shown above (see [Figure A1](#)). Tellingly, the first election under PR in 1919 put an end to the radical hegemony.

Hence, there can be no doubt that the radical movement had the *possibility* to adapt electoral district boundaries for political reasons, i.e. gerrymandering. Yet, this is of course no proof that they actually resorted to partisan redistricting. Electoral disproportionalities can also result from processes other than gerrymandering. The difficulty of conclusively demonstrating the existence of gerrymandering is one of the reasons why gerrymandering is a popular form of electoral malpractice in electoral autocracies. As Wong (2017, pp. 585–586) notes, gerrymandering is fairly inexpensive, can be legally performed by the ruling parties in accordance with standard election laws, does not require changing citizens' vote choice, and its causal impact is usually imperceptible to most voters. On the next pages, we provide some evidence that the redistricting process in Switzerland from 1848 to 1917 was indeed characterized by gerrymandering (as argued most prominently by Gruner, 1978a; Natsch, 1967, 1972).

Unfortunately, there is only limited roll-call data on the parliamentary votes on redistricting. Roll-call votes had to be explicitly demanded. Only in case of the 1881 and 1890 reforms did the political opposition demand roll-call votes, which were subsequently documented in the parliamentary records. Yet, the available evidence suggests that the parliamentary votes were divided along the expected lines. While the Catholic Conservatives *unanimously* opposed the redistricting reforms in both

1881 and 1890, the Radicals supported the reforms overwhelmingly.<sup>29</sup> The Social Democrats had no representatives in the national parliament before 1890. In 1902, 32 MPs – presumably primarily Catholic Conservatives and Social Democrats (together, they held 36 seats in the lower chamber) – opposed the reform of districts, while 81 supported it. In 1911, 76 MPs supported the reform, while only four MPs opposed it. In this parliamentary vote, the vast majority of opposition MPs had decided to abstain.

In the following, we provide two kinds of evidence in support of our claim that the Radicals relied on gerrymandering to protect their absolute majority in parliament. In the next section, we show that the probability of redistricting increases with social democratic vote shares. Put differently, wherever the Social Democrats increased their vote share, the likelihood of redistricting increases. In addition, we show that redistricting decisions led to increasing disproportionalities for the opposition Social Democrats. Put differently, the redistricting reforms were biased against the Social Democrats. Admittedly, this is not conclusive evidence of gerrymandering, because these relationships might also be the result of malapportionment. Yet, this pattern is at the very least highly suspicious.

Subsequently, we provide qualitative evidence on the process of gerrymandering using two key cantons. As the Swiss constitution does not allow electoral districts to cut across cantonal borders, redistricting decisions in the national council were discussed on a canton-by-canton basis. We first look at the canton Lucerne, which is the "lead canton" of the Catholic Conservatives. The short Swiss civil war of 1847 between most of the Catholic cantons (the "Sonderbund") and the mostly Protestant cantons ended with the attack and subsequent capitulation of Lucerne, the Sonderbund's unofficial "capital". Yet, remarkably, this key Catholic conservative canton sent for a long time a majority radical delegation to the national council. Lucerne is also a good

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<sup>29</sup>Yet, radical support was not unanimous because in some cantons, redistricting disputes concerned different factions within the radical movement. This is most notably the case in cantons, where the Catholic Conservatives and Social Democrats were virtually absent (e.g. Vaud).

illustration for gerrymandering because the redistricting process is quite visible on maps of electoral districts. Subsequently, we turn to the canton Zurich. This heavily industrialized and growing canton featured a very strong Social Democratic Party. Yet, the canton Zurich was also notorious for partisan redistricting (Kummer, 1969). As a result, the Social Democrats in Zurich struggled mightily to translate their large number of votes into a relevant number of seats. As we show in this short case study, the main reason can be found in the way electoral districts were created and adapted.

## 2.2 The Causes and Consequences of Redistricting: Gerrymandering against the Social Democrats

In this section, we show that the probability of redistricting increases with social democratic vote share and that redistricting reforms increased the bias against the Social Democrats. We use information on all elections for the national council in Switzerland between 1890 and 1917 as well as on changes in the composition of electoral districts (the Social Democratic Party was founded in 1888). In Models 1 and 2 in [Table A5](#), our dependent variable is the electoral disproportionality of the Social Democratic Party on the cantonal level. Please note that negative values indicate that the Social Democrats are disadvantaged by the electoral system. Redistricting is measured as a binary variable capturing whether district boundaries in a canton have been redrawn or, in a few instances, districts have been merged. To control for unobserved constant or slow moving confounders, we employed canton fixed effect with canton-specific linear (Model 1) or squared time trends (Model 2). In addition, we use wild cluster bootstrap standard errors to account for correlation within cantons and the low number of cluster in our sample. The results of both models show that redistricting increases electoral disproportionalities disadvantaging the Social Democratic Party by three percentage points (as expressed in a negative regression coefficient).

In Model 3 in [Table A5](#), we employ our binary redistricting measure as dependent variable to show that redistricting was indeed employed by the Radicals as a reaction to the increasing electoral strength of the Social Democratic Party. Given that redistricting was only legally permitted in ten year intervals (after a national census was conducted), our sample is reduced to 75 observations, covering the new electoral laws in 1890, 1902, and 1911. To estimate the effect of the electoral advances of the left on the probability that redistricting is employed, we use changes in social democratic vote shares (cantonal level) between the enactment of two electoral laws. In addition, we use a dummy for sparsely populated agrarian cantons (e.g. Appenzell Inner-

Rhodes) as well as small city cantons (e.g. Basel-City) where redistricting was never employed between 1851-1917. Given our small sample size as well as the low number of redistricting events (17 out of 75 observations), we chose Firth’s penalized maximum likelihood estimator over the standard logit estimator since the former performs better in terms of bias and variance reduction in small samples. Moreover, we use cluster robust standard errors to account for correlation within cantons. Model 3 in [Table A5](#) shows that increases in social democratic vote share increase the probability of redistricting in a canton.

To provide additional evidence, we plot the predicted probabilities in [Figure A2](#). The figure demonstrates that even small increases in social democratic vote share, i.e. below 10%, lead to a higher probability that redistricting is employed.

Table A5: Redistricting - Effect and Cause

	<i>Dependent variable:</i>		
	Disproportionality		Redistricting
	(1)	(2)	(3)
Redistricting	-2.936*** (0.857)	-3.160*** (0.602)	
$\Delta$ Soc. Dem. Vote Share			0.139*** (0.024)
No Occurrence Redist.			-5.040*** (0.279)
Constant	1,463.018*** (13.351)	-41,079.020*** (4,596.422)	0.132 (0.291)
Canton FE w. Time Trend	Yes	No	No
Canton FE w. Time Trend sq.	No	Yes	No
Observations	248	248	75
Akaike Inf. Crit.			46.137

*Note:* Cluster Robust Standard Errors by Canton. \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

Hence, [Table A5](#) shows that redistricting was more likely in presence of increasing social democratic vote shares (Model 3) *and* that redistricting on average increased electoral disproportionalities disfavoring the Social Democrats (Models 1 and 2, negative values indicating disadvantage). In the next subsection, we forward further evidence on the political use of redistricting. We show how seat-maximization concerns influenced political debates in the national council on redistricting in the cases of Lucerne and Zurich.

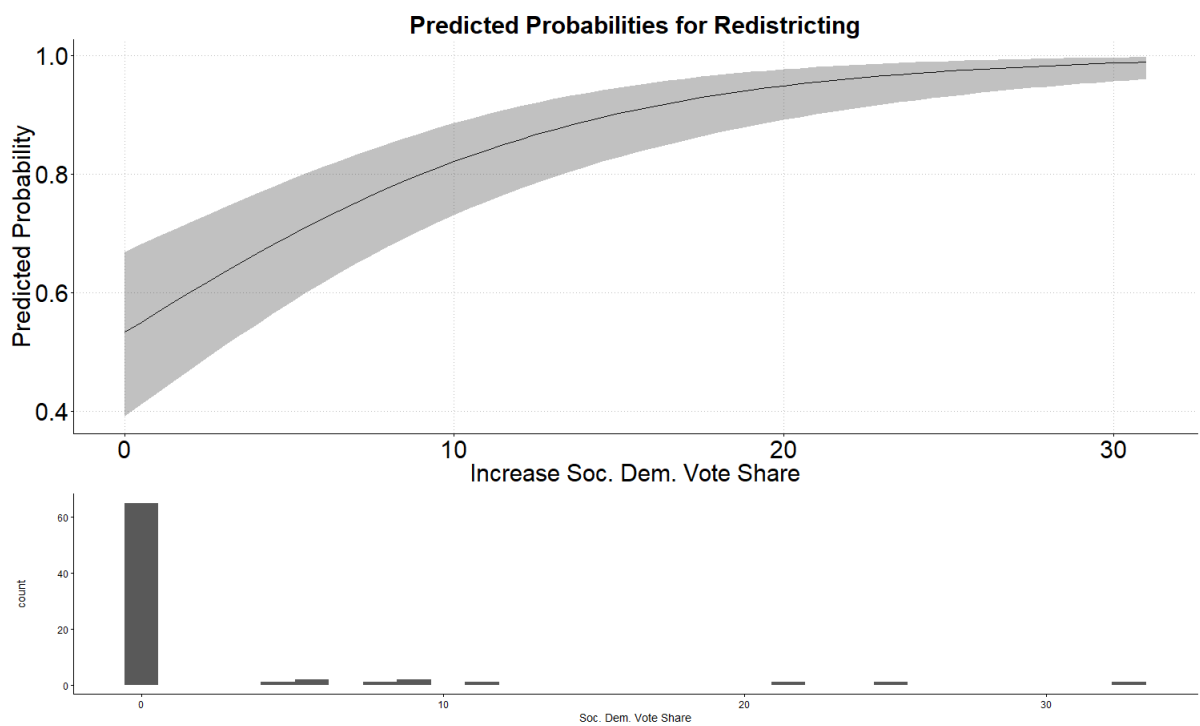


Figure A2: Social Democratic Vote Share and the Occurrence of Redistricting



## 2.3 Gerrymandering: The Case of Lucerne

The canton Lucerne was the lead canton of the Catholic Conservatives. The separate alliance ("Sonderbund") it led resulted in the short Swiss civil war of 1847. The significance of Lucerne is also reflected in the official sequence of cantons. In official communication (or visual representations), Swiss cantons always appear in the same sequence. The cantons Zurich and Bern, the two largest Swiss cantons and the leaders of the anti-Sonderbund coalition, come first, followed by Lucerne. Only then are cantons listed in the sequence in which they joined the Swiss Confederation. Hence, although Lucerne is only a mid-sized canton, it has a considerable symbolic relevance.

After the end of the civil war in 1847, the (radical) winners installed radical cantonal governments in the Sonderbund cantons (including Lucerne), which were also in charge of devising the electoral districts for the first national election in 1848. Put differently, a radical government created the districts for an election, which would pitch radical against catholic conservative candidates immediately after a short civil war. The radical government opted for six single-member districts (see [Figure A3](#)), which proved to be a good strategy, as the Radicals managed to win five out of six seats in 1848. However, this decisive victory was facilitated by massive mobilization problems on behalf of the Catholic Conservatives in the immediate aftermath of the civil war. In subsequent elections, this advantage was likely to disappear. In addition, the catholic conservative seat was won by Philipp Anton von Segesser, whose family had played a leading role in the Sonderbund and who immediately became the leading voice of the catholic conservative parliamentary faction. Getting rid of von Segesser would remain a key goal in subsequent district reforms and elections.

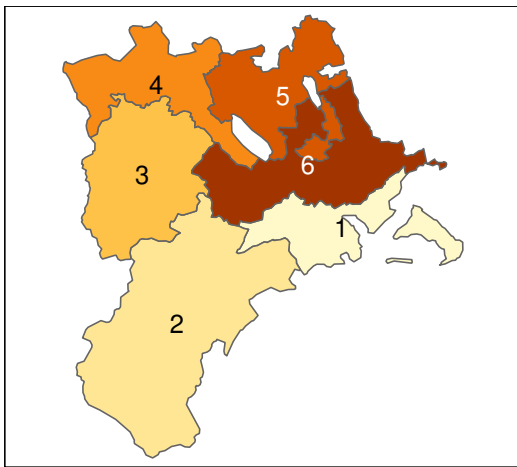
In the run up to the 1851 national election, the national parliament, now responsible for district reform, revisited the original electoral districts and adapted their size (following the 1850 census). Due to population growth, Lucerne received a seventh seat. Yet, there were considerable concerns that the Catholic Conservatives were getting ready for a political comeback. The electoral districts in Lucerne were thus the

topic of a long and controversial discussion in the national council. At one point, the leading radical MP Alfred Escher (Zurich, also president of the national council in 1849/50) remarked that all radical cantons (i.e. cantons where the Radical Party had won the 1848 election) were satisfied with the new electoral districts with the exception of Lucerne: "Yet, it is difficult to help the latter if one does not want to abandon basic principles [i.e. the constitution]" (cited in Gagliardi, 1920, p. 168). The radical majority in the national council in 1851 ultimately opted for three most unusual electoral districts (see [Figure A3](#)). By packing as many catholic conservative voters as possible into the 12<sup>th</sup> district, the national council had created an electoral district in which two catholic conservative candidates were elected virtually unopposed. Yet, they kept the 12<sup>th</sup> district deliberately small, thus ensuring that the 12<sup>th</sup> district would not be allocated more than two seats. In this process, they even cut the 12<sup>th</sup> district into two parts without a direct point of contact. Instead, they created two districts of two and three seats respectively, which were structured in a way to make a radical victory in both districts likely. For this purpose, they combined most unlikely areas, such as the very rural and catholic conservative Entlebuch with the city of Lucerne, a radical stronghold. This combination was necessary to ensure that another seat could be allocated to the 11<sup>th</sup> district (which Radicals won) instead of the 12<sup>th</sup> district (which the Catholic Conservatives won).

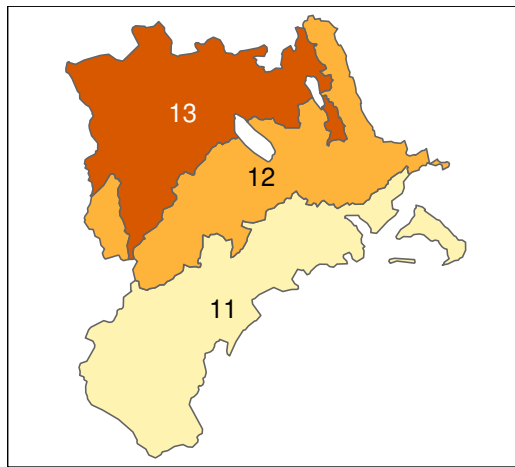
Catholic conservative MPs in the national parliament immediately spotted and criticized this most unusual combination of historical regions. Pressed to justify these electoral districts, the radical speaker pointed to geological reasons, arguing that the ground below the 11<sup>th</sup> district was characterized by limestone, while the ground below the 12<sup>th</sup> district contained molasse. The 13<sup>rd</sup> district was simply referred to as plain land. Unimpressed by this argument, the catholic conservative speaker, MP von Segesser (Lucerne), mockingly described the Radicals' behavior in the following words: "Leave it to me to find districts for the canton Lucerne, and tell me, which party is supposed to win the majority. I will find districts for any party, so they can win the majority" (cited in Gruner, 1978a, p. 341). Yet, the radical majority in parlia-

Figure A3: Electoral Districts in Lucerne, 1848-1872

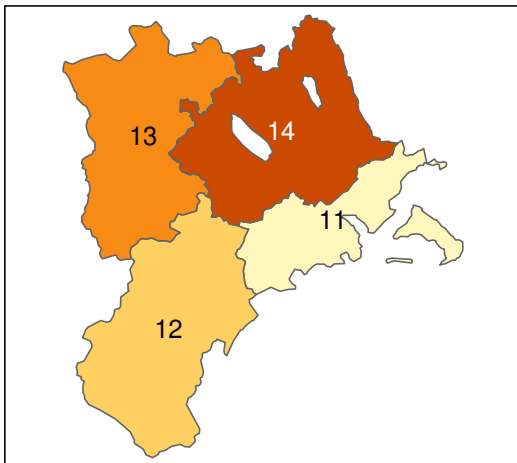
1848



1851



1872



ment went ahead as planned and won five out of seven seats in the 1851, 1854, 1857, and 1860 elections.

Given this success, there was no need to change electoral districts in 1863. The Radicals and their political allies continued to win five out of seven seats in the 1863 and 1866 elections. Yet, in the 1869 election, the Catholic Conservatives finally captured the 13<sup>rd</sup> district, thus winning five out of seven seats. Little surprise then that the Radicals took advantage of the 1872 electoral district reform to reorganize electoral districts also in the canton Lucerne. The Radicals completely restructured the electoral districts. As [Figure A3](#) shows, there is hardly any resemblance between the districts set in 1851 and the ones set in 1872. By the 1870s, the Catholic Conservatives had regained most of their former strength and now won about 70 % of the votes (Gruner, 1978b, pp. 381–383). Hence, the Radicals had to accept that the Catholic Conservatives would send a larger delegation to the national council. Yet, with the careful selection of electoral districts, often with references to the need to protect political minorities (albeit only radical ones, see the case study of Zurich below), they were still determined to win as many seats as possible. By expanding the 11<sup>th</sup> district (the city of Lucerne) to the surrounding areas in 1872, they were able to protect their majority in this district, all the while keeping the district large enough to merit two seats. However, given the overwhelming strength of the Catholic Conservatives, the rest of the canton was now finally left to the political opposition.

Hence, the case of Lucerne not only demonstrates how the Radicals used gerrymandering to increase their seat share, the case also shows how the Catholic Conservatives could gain substantial representation in parliament over time due to their geographically highly concentrated voter base in the Catholic heartlands of Switzerland. Given the electoral strength of the Catholic Conservatives in these cantons (e.g. ca. 70 % of the vote in the canton Lucerne), the effectiveness of redistricting as an instrument of containment is thus somewhat limited. Over time, the Radicals therefore opted to integrate – rather than exclude – the Catholic Conservatives. In 1891, a prominent

member of the Catholic Conservatives, Joseph Zemp from Entlebuch, was elected to become a member of the Swiss Federal Council (consisting of seven members, all other members were part of the Radical Party and their political allies). However, this is not to suggest that the Radicals refrained from using gerrymandering in the case of the Catholic Conservatives. For instance, the Radicals used the 1902 district reform to move some municipalities and thus one seat from the 13<sup>rd</sup> (formerly the 12<sup>th</sup> district, a catholic conservative stronghold) to the 12<sup>th</sup> district (formerly the 11<sup>th</sup> district, a radical stronghold), which allowed the Radicals to win three out of seven seats in the 1902, 1905, and 1908 elections. Yet, the Catholic Conservatives secured the additional eight seat, which was allocated to the canton Lucerne in 1911 due to population growth.

The situation was, however, different in the case of the Social Democrats. Unlike the Catholic Conservatives, the Social Democrats challenged the Radicals in their urban strongholds. At the same time, the Social Democrats did not benefit from "social democratic heartlands", i.e. cantons where they would have been able to obtain a large majority of the vote. Hence, from the 1890s onward, the Radicals directed their institutional engineering by means of redistricting primarily at the Social Democrats, who suffered from electoral disproportionalities that eclipsed even the ones the Catholic Conservatives had suffered in the first decades after 1848 (see [Figure A1](#)). The next brief case study thus turns to the canton Zurich, where the Social Democrats were electorally strong, but nevertheless failed to secure a substantial representation in the national parliament.

## 2.4 Gerrymandering: The Case of Zurich

The canton Zurich had been a stronghold of the Radical Party since the creation of the Swiss Federal State in 1848. While the emerging Democratic Party began to challenge the Radicals in the late 1860s, the relationship soon became collaborative (both parties became part of what we refer to as the "radical movement"). For instance, in the 1869 election, every seat in the canton was contested (13 seats with 26 candidates). In contrast, in the last election before the Social Democratic Party participated independently, in 1887, only 22 candidates ran for 16 seats (Gruner, 1978b). Only the first district was seriously contested, in particular due to the presence of several 'wild' socialist candidates, which were, however, all unsuccessful.

At the turn of the century, the Social Democratic Party became a serious political force in the canton Zurich. In the 1899 national elections, the Social Democrats received about a quarter of the votes but gained only one out of then 17 seats. Following the national census in 1900, the number of seats allocated to the canton Zurich increased from 17 to 22. When the reform of electoral districts was discussed in the national parliament (where decisions on redistricting were made, see above), the only social democratic MP elected in Zurich, Jakob Vogelsanger, was complaining about the size and boundaries of the current districts. In order to ensure a better representation of the voters' preferences, he demanded the adjustment of district boundaries to reduce the bias against the Social Democrats. However, the submission of the proposal to the responsible commission was rejected by 71 to 38 votes. As a result, the draft of the Federal Government, dominated by the Radical Party and their political allies, was enacted by the parliament unaltered.

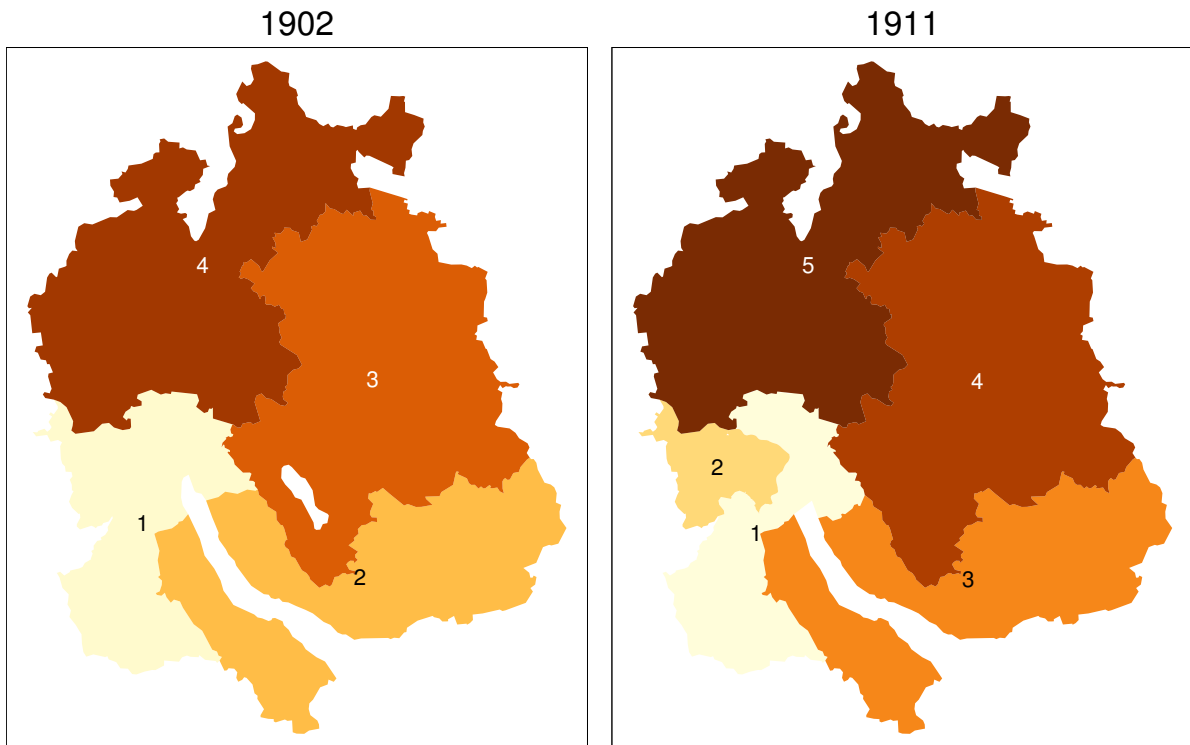
Hence, while adjusting the magnitude of some electoral districts as well as shifting a few municipalities across districts, the reform did not remove the bias against the social democratic candidates (Amtliches Stenographisches Bulletin der Schweizerischen Bundesversammlung, 1902). The disadvantaged position of the Social Democrats did thus not change. As a result, in the election before the next national census, in 1908,

the Social Democratic Party received 35 % of the votes in the canton Zurich, yet only 2 out of (then) 22 seats.

The 1910 national census showed that rapid population growth in the canton Zurich made the reform of electoral districts inevitable. The number of seats allocated to the canton Zurich increased from 22 to 25. Since much of the population growth was concentrated in the industrial center of the canton (the first district, the city of Zurich), the ensuing discussion was dominated by the question whether the first district, now consisting of twelve seats, should be split into two districts. The dominant political force in the parliament, the Radical Party, was split on this question. The first group supported the division of the first district in order to reduce the level of electoral competition and make the outcome more predictable. To do so, they wanted to create a new district (the new second district) with five of the first district's twelve seats (see [Figure A4](#)). This new district was supposed to become a social democratic stronghold, where all the social democratic votes would be concentrated, thereby denying the Social Democrats an efficient use of their votes.

However, a second group criticized the proposal. The radical MP Walter Bissegger (Zurich) summarized the position of the opponents within the Radical Party. Responding to the social democratic MP Herman Greulich's (Zurich) claim that the rise of the Social Democratic Party was unstoppable, the radical MP Bissegger remained unimpressed: "Claims about the unstoppable growth of the Social Democratic Party are quite self-serving. Yet these claims are neither important nor instructive for this hall [i.e. the National Council]. Once again, the bourgeois parties will not have to fear this electoral contest and in fact they do not" (*Amtliches Stenographisches Bulletin der Schweizerischen Bundesversammlung*, 1911, p. 110). However, the majority of the commission voted in favor of splitting the first district. In this way, a new second district was created, which was designed to become a stronghold of the Social Democratic Party. The Radical Party thus opted to contain the Social Democratic Party by means of redistricting ("packing") rather than to engage in direct electoral

Figure A4: Electoral Districts in Zurich, 1902-1911



competition.

In this parliamentary debate, the Social Democrats attempted to push for better representation by demanding that the first district should be split evenly. The newly founded district in the social democratic stronghold had about 95'000 inhabitants. Assigning a municipality with about 5'000 inhabitants to this new district would have resulted in the reallocation of an additional seat from the first district to the newly created second district. Taking the mismatch of social democratic vote and seat share of the 1908 election as a point of reference (35 % of the votes but only 9 % of the seats), it is clear that such a demand would have been justified. However, the proposal was clearly defeated in parliament by 118 to 7 votes (*Amtliches Stenographisches Bulletin der Schweizerischen Bundesversammlung*, 1911, p. 119).

Ursurprisingly, the Social Democratic MPs reacted strongly to this decision. After several Radical MPs had argued for a reform of electoral districts in the canton Fri-



bourg in order to protect the minority of radical voters in this otherwise catholic conservative canton, social democratic MP Greulich (Zurich) remarked mockingly that if only the Radicals were equally concerned when minorities other than radical ones were affected. He then provided a whole list of district reforms that would help social democratic candidates win seats and reduce some of the most extreme electoral disproportionalities, including a reform of districts in the canton Zurich (Amtliches Stenographisches Bulletin der Schweizerischen Bundesversammlung, 1911, p. 132). In addition, Greulich described the electoral districts in the canton Zurich as an example of gerrymandering ("*Wahlkreisgeometrie*") in "its most absurd form" (Amtliches Stenographisches Bulletin der Schweizerischen Bundesversammlung, 1911, p. 104).

Tellingly, the radical MP Robert Forrer (St.Gallen) immediately responded to Greulich, arguing that the situation in the canton Fribourg was particularly bad and thus not comparable to the examples provided by Greulich (Amtliches Stenographisches Bulletin der Schweizerischen Bundesversammlung, 1911, p. 134). Given the overall level of electoral disproportionality in Switzerland (see [Figure A1](#)), this is a highly questionable claim. Yet, it lends evidence to Wong's (2017) argument that gerrymandering is a particularly subtle form of electoral malpractice, because its use is difficult to conclusively prove.

In the end, the new second district in the canton Zurich slightly reduced the mismatch between vote and seat shares for the Social Democrats. In the 1911 election, the Social Democratic Party received 42 % of the votes and 6 out of now 25 seats (the Radical Party and its political allies won the other 19 seats). However, concentrating all social democratic voters in a "safe district" limited their ability to make any further electoral advances in the canton Zurich. Despite continuing vote growth, the Social Democratic Party thus struggled to gain any additional seats in subsequent elections. Hence, although the Social Democratic Party had by now become the electorally strongest party (in terms of electoral potential), it was still denied an adequate representation in parliament. Tellingly, the Social Democrats had (only) to wait for the first election

under PR (1919) in order to win more seats than the Radicals in the canton Zurich.

## 2.5 Other Cases of Gerrymandering

Table A6: Mechanism of Redistricting for Lower House Elections

Country	Mechanism	Source
Australia	Long-standing susceptibility to gerrymandering. Independent boundary commission established in 1918. Nevertheless evidence for electoral bias for period 1949-93	Jackman (1994), Medew (2008)
Austrian Empire	Gerrymandering widespread between 1860 and 1918, responsibility of parliament	Melik (1997), Ucakar (1985)
Belgium	Accounting for population growth via adjustment of district magnitude, no changes of district boundaries	Barthélemy (1912)
Canada	Government responsible from 1872 to 1964 for the redistricting process, resulting in widespread gerrymandering; independent boundary commission was established in 1964	Courtney (2001)
Denmark	No adjustment of district boundaries in the period 1849-1915 except 1894; yet considerable malapportionment in favor of rural-based liberals	Elklit (2002)
France	Government responsible for the redistricting process, considerable malapportionment in favor of right-wing parties, especially during the "Third Republic"	Marty (2013)
Imperial Germany	No adjustment of district boundaries in the period 1871-1918 by parliament; yet considerable malapportionment in favor of rural-based parties (conservatives/center party)	Reibel (2007)
Ireland	Redistricting in the hands of government from 1922-1974; an independent boundary commission was established in 1977	Coakley (2008)
New Zealand	Widespread gerrymandering until 1887. Despite establishing an independent boundary commission, episodes of gerrymandering between 1946 and 1956	McRobie (2008)
Switzerland	Gerrymandering widespread between 1848 and 1917, responsibility of parliament	Gruner (1978a), Natsch (1967)
United Kingdom	The Redistribution of Seats Act 1885 has been seen as a strong case of gerrymandering.	Ahmed (2013), Rossiter, Johnston, and Pattie (1999)
United States of America	Gerrymandering has been common since the late 18 <sup>th</sup> century.	Cox and Katz (2002), Lublin (2007)

### 3 Robustness Tests

In this section, we provide a number of additional robustness tests. In [Table A7](#), we estimate a linear probability model with wild bootstrapped cluster robust standard errors in order to account for the low number of clusters (i.e. parties). [Table A8](#) displays our estimations employing a number of additional control variables related to party leadership, political competition, economic development, and the radicalization of the left (beyond the control variables already contained in model 5 in [Table 2](#)). In addition, we provide evidence that our specification holds across votes by estimating our main models separately for 1900 ([Table A9](#)), 1910 ([Table A10](#)), 1914 ([Table A11](#)), and 1918 ([Table A12](#)). As these estimations by year show, our main result (the interaction effect between social democratic electoral potential and electoral disproportionality) is significant in all four years. Admittedly, the effect is weakest in 1900, but it is important to note that in 1900, the Social Democratic Party was still very weak (both with regard to its electoral potential as well as seats in parliament). There is thus a simple explanation for the somewhat weaker effects in the 1900 models. In the absence of a sufficient number of social democratic MPs, there are only few observations characterized by a high social democratic electoral potential and suffering from electoral disproportionalities. Still, the interaction effect is significantly different from zero for the 1900 vote (with the exception of Models 6 and 7). Hence, our results also mostly hold for the 1900 vote.

In [Table A13](#), we provide evidence that our results hold when excluding the social democratic MPs from the sample. In addition, we follow Leemann and Mares (2014) by using vote-seat disproportionality and the social democratic vote share, both located on the district level, to show that our preferred specification is superior (see Model 1 in [Table A13](#)). Furthermore, we demonstrate that our measures for disproportionality and the socialist threat based on electoral potential data cannot be simply substituted by vote share data. In [Table A14](#), we employ measures for disproportionality and the electoral strength of the Social Democratic Party, both calcu-

lated using cantonal vote shares instead of electoral potential. The results show that both variables fail to reach statistical significance in almost all model specifications. [Table A14](#) therefore provides additional evidence that vote share is a problematic indicator in the presence of redistricting for measuring disproportionality and the electoral threat of the Social Democrats. The null findings do not align with our argument and, more importantly, with the existing literature on electoral systems choice.

Lastly, we correct for the assumption that the vote-to-seat translation will be perfectly proportional under PR. To do so, we use electoral potential and the number of seats at the canton level (i.e. the electoral districts under PR) to simulate the seat allocation using the D'Hondt method that was used to implement PR in 1919 in Switzerland. We then subtract the amount of disproportionality for each party under D'Hondt from our disproportionality measure. We employ our alternative disproportionality measure with D'Hondt as baseline in [Table A15](#), which demonstrates that our results are robust. [Table A16](#) displays our results using a disproportionality measure that is weighted by cantonal seat shares. Again, our results are robust.

Table A7: Linear Probability Models on PR Votes with Bootstrapped Cluster Robust Standard Errors

	<i>Dependent variable:</i>							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Electoral Dispro. Canton	-1.426*** (0.431)	-0.637*** (0.230)	-0.644*** (0.238)	-0.644*** (0.246)	-0.663*** (0.238)	-0.639** (0.253)	-0.647** (0.256)	-0.435** (0.182)
Soc. Dem. Electoral Potential	-0.006*** (0.002)	-0.003 (0.002)	-0.003* (0.002)	-0.003** (0.001)	-0.003 (0.002)	-0.005*** (0.001)	-0.005*** (0.002)	0.001 (0.001)
Elec. Dispro.*Soc. Dem.		-0.043*** (0.003)	-0.043*** (0.002)	-0.042*** (0.004)	-0.041*** (0.001)	-0.035*** (0.003)	-0.040*** (0.002)	-0.045*** (0.007)
Co-Specific Assets			1.127* (0.603)			-2.037* (1.151)	-1.022 (1.011)	0.191 (0.998)
Trade				0.214 (0.167)		0.233* (0.133)	0.227 (0.163)	-0.611* (0.317)
Second Round Voting					0.122*** (0.044)	0.101*** (0.034)	0.126*** (0.046)	0.081 (0.061)
Third Round Voting					-0.166 (0.103)	-0.194 (0.131)	-0.143* (0.086)	-0.231* (0.140)
Right Margin					0.020 (0.065)	0.032 (0.074)	0.017 (0.060)	-0.064 (0.065)
Party Elite					0.138*** (0.050)	0.144*** (0.051)	0.140*** (0.051)	0.208** (0.081)
Soc. Dem. Seat Dis.						0.043 (0.069)		
Number of Strikes						-0.0001 (0.0001)	-0.0003*** (0.0001)	-0.001*** (0.0002)
Soc. Seat*Num. Strikes						0.001*** (0.0002)		
Soc. Dem.*Num. Strikes							0.00002*** (0.00001)	0.00001 (0.00000)
Constant	0.495*** (0.028)	0.430*** (0.031)	0.429*** (0.032)	0.387*** (0.034)	0.411*** (0.023)	0.374*** (0.037)	0.396*** (0.044)	0.331*** (0.110)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	No	No	No	No	No	No	No	Yes
Observations	547	547	547	547	547	547	547	547

Note: Wild Cluster Bootstrap-t Standard Errors by Party. \* p<0.1; \*\* p<0.05; \*\*\* p<0.01

Table A8: Logit Models on PR Votes - Additional Controls

	Dependent variable:										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Electoral Dispro. Canton	-7.795*** (1.048)	-2.413 (1.623)	-2.240 (1.471)	-2.285 (1.530)	-2.171 (1.602)	-2.457 (1.627)	-2.360* (1.434)	-2.640* (1.420)	-2.105 (1.622)	-2.420 (1.472)	-2.341 (1.475)
Soc. Dem. Electoral Potential	-0.032 (0.026)	-0.001 (0.030)	-0.002 (0.024)	0.001 (0.024)	-0.005 (0.024)	-0.006 (0.025)	0.003 (0.026)	-0.006 (0.026)	0.001 (0.024)	-0.006 (0.025)	-0.015 (0.033)
Right Margin	0.141 (0.439)	0.192 (0.383)									
Rig. Mar.*Soc. Dem.	-0.007 (0.017)	-0.013 (0.020)									
Elec. Dispro.*Soc. Dem.	-0.451*** (1.130)	-0.451*** (1.130)	-0.455*** (1.119)	-0.453*** (1.115)	-0.469*** (1.110)	-0.450*** (1.127)	-0.475*** (1.125)	-0.443*** (1.122)	-0.461*** (1.122)	-0.451*** (1.127)	-0.445*** (1.132)
Number of Parties			-0.146 (0.241)								
District Magnitude				-0.171 (0.183)							
PR Canton					0.694* (0.395)						
Urbanization						-0.109 (0.515)					
Agricul. Share							3.039 (2.548)				
Compulsory Voting								-0.498 (0.535)			
Direct Democracy									-0.222*** (0.040)		
Strike Participation										-0.00001 (0.00002)	-0.0001 (0.0001)
Soc. Dem.*Strike Par.											0.00001 (0.00001)
Constant	-0.417 (1.091)	-0.602 (1.042)	-0.234 (1.394)	0.041 (1.504)	-0.546 (1.134)	-0.448 (1.248)	-2.019 (1.429)	-0.563 (1.229)	0.050 (1.126)	-0.476 (1.250)	-0.454 (1.234)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	No	No	No	No	No	No	No	No	No	No	No
Controls Table 2 Model 5	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	547	547	547	547	547	547	547	547	547	547	547
Akaike Inf. Crit.	603.173	561.362	557.609	551.134	552.110	559.549	548.310	556.924	553.389	559.764	560.896

Note: Cluster Robust Standard Errors by Party. \*p<0.1, \*\*p<0.05, \*\*\*p<0.01



Table A9: Logit Models on PR Votes 1900

	<i>Dependent variable:</i>						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Electoral Dispro. Canton	-4.234** (2.145)	-0.015 (1.154)	0.181 (0.817)	0.086 (1.310)	-0.337 (1.224)	0.111 (1.173)	-0.331 (1.412)
Soc. Dem. Electoral Potential	-0.081 (0.063)	-0.063 (0.053)	-0.052 (0.051)	-0.061 (0.049)	-0.057 (0.055)	-0.088** (0.037)	-0.071 (0.088)
Elec. Dispro. Can.* Soc. Dem. Par. Str.		-0.849* (0.448)	-0.876* (0.490)	-0.866* (0.493)	-0.925* (0.513)	-1.089 (0.781)	-0.913 (0.563)
Co-Specific Assets			-93.827 (87.990)			-92.036 (162.790)	-7.319 (92.086)
Trade				-0.497 (1.588)		-0.761 (1.444)	-0.142 (0.941)
Second Round Voting					-0.597 (1.245)	-0.708 (1.801)	-0.539 (1.183)
Third Round Voting					-13.773*** (0.886)	-13.519*** (1.587)	-13.802*** (1.142)
Right Margin					1.220* (0.666)	0.984 (0.606)	1.022* (0.573)
Party Elite					-0.900 (1.574)	-0.909 (1.594)	-0.960 (1.610)
Soc. Dem. Seat Dis.					9.431*** (3.488)	9.431*** (3.488)	9.431*** (3.488)
Number of Strikes						-0.002 (0.002)	-0.003 (0.003)
Soc. Seat*Num. Strikes						-0.057*** (0.021)	-0.057*** (0.021)
Soc. Dem.*Num. Strikes							0.0001 (0.001)
Constant	0.140 (1.350)	0.022 (1.234)	0.168 (1.336)	0.120 (1.262)	-0.597 (1.268)	0.099 (1.499)	-0.188 (1.437)
Observations	111	111	111	111	111	111	111
Akaike Inf. Crit.	122.972	113.279	114.913	115.197	117.541	118.354	124.353

Note: Cluster Robust Standard Errors by Party. \* p<0.1; \*\*p<0.05; \*\*\* p<0.01

Table A10: Logit Models on PR Votes 1910

	<i>Dependent variable:</i>						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Elec. Dispro. Canton	-10.403*** (2.539)	9.837*** (1.791)	10.622*** (2.950)	9.983*** (2.336)	10.059*** (1.772)	9.792* (5.762)	9.335** (4.392)
Soc. Dem. Electoral Potential	-0.015 (0.040)	0.039* (0.023)	0.026 (0.022)	0.042 (0.045)	0.037 (0.025)	0.081 (0.089)	0.011 (0.042)
Elec. Dispro.* Soc. Dem. Par. Str.		-1.677*** (0.319)	-1.801*** (0.506)	-1.699*** (0.361)	-1.664*** (0.306)	-1.973*** (0.546)	-1.765*** (0.552)
Co-Specific Assets			63.304 (127.126)			-36.052 (238.144)	-77.097 (104.436)
Trade				-0.370 (2.779)		-1.207 (2.456)	-1.282 (2.573)
Second Round Voting					0.068 (0.204)	-0.188 (0.667)	-0.044 (0.485)
Right Margin					-0.343 (0.422)	-0.244 (0.219)	-0.636** (0.262)
Party Elite					1.285*** (0.396)	1.398*** (0.356)	1.739*** (0.509)
Soc. Dem. Seat Dis.						-2.702 (3.542)	
Number of Strikes						-0.002 (0.003)	-0.005** (0.002)
Soc. Seat*Num. Strikes						0.024 (0.019)	
Soc. Dem.*Num. Strikes							0.001*** (0.0001)
Constant	0.043 (1.690)	-0.266 (1.301)	-0.338 (1.420)	-0.214 (1.093)	-0.130 (1.200)	0.168 (1.377)	0.863 (1.155)
Observations	139	139	139	139	139	139	139
Akaike Inf. Crit.	144.785	119.655	121.124	121.612	124.054	127.465	125.708

Note: Cluster Robust Standard Errors by Party. \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

Table A11: Logit Models on PR Votes 1914

	<i>Dependent variable:</i>						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Elec. Dispro. Canton	-7.563*** (1.703)	-3.036 (2.751)	-3.095 (2.518)	-3.120 (2.790)	-4.447* (2.662)	-4.200 (2.998)	-4.473 (2.814)
Soc. Dem. Electoral Potential	-0.028 (0.024)	-0.001 (0.032)	-0.0001 (0.032)	-0.006 (0.035)	-0.009 (0.031)	-0.021 (0.046)	-0.050 (0.053)
Elec. Dispro.* Soc. Dem. Par. Str.		-0.731*** (0.200)	-0.745*** (0.169)	-0.697*** (0.182)	-0.788*** (0.202)	-0.731*** (0.174)	-0.721*** (0.181)
Co-Specific Assets			9.490 (34.906)			-26.968 (30.749)	-17.700 (32.299)
Trade				2.008 (1.825)		1.556 (1.796)	1.740 (1.964)
Second Round Voting					1.587*** (0.469)	1.639*** (0.578)	1.745*** (0.607)
Right Margin					-0.487 (0.666)	-0.294 (0.565)	-0.450 (0.680)
Party Elite					0.305 (0.511)	0.541 (0.517)	0.381 (0.546)
Soc. Dem. Seat Dis.						0.304 (1.340)	
Number of Strikes						-0.00002 (0.001)	-0.0003 (0.001)
Soc. Seat*Num. Strikes						0.004 (0.005)	
Soc. Dem.*Num. Strikes							0.0004 (0.0003)
Constant	0.454 (1.048)	0.149 (1.117)	-0.188 (1.825)	-0.287 (1.011)	0.408 (1.151)	0.774 (1.987)	0.660 (1.902)
Observations	155	155	155	155	155	155	155
Akaike Inf. Crit.	171.722	152.691	154.425	152.882	151.490	158.317	157.512

Note: Cluster Robust Standard Errors by Party. \*p<0.1; \*\*p<0.05; \*\*\*p<0.01.

Table A12: Logit Models on PR Votes 1918

	<i>Dependent variable:</i>						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Elec. Dispro. Canton	-10.021*** (2.414)	0.156 (1.745)	0.156 (1.756)	-0.015 (1.693)	1.126 (2.320)	0.336 (2.649)	0.185 (3.336)
Soc. Dem. Electoral Potential	-0.033 (0.021)	0.018 (0.019)	0.018 (0.019)	0.020 (0.017)	0.021 (0.021)	0.010 (0.024)	0.002 (0.030)
Elec. Dispro.* Soc. Dem. Par. Str.		-0.395*** (0.099)	-0.395*** (0.100)	-0.400*** (0.103)	-0.416*** (0.089)	-0.385*** (0.092)	-0.402*** (0.106)
Co-Specific Assets			0.011 (4.959)			-9.149 (10.859)	-7.495 (10.395)
Trade				-0.488 (0.965)		-0.081 (0.869)	0.095 (1.154)
Second Round Voting					0.946** (0.436)	0.532*** (0.080)	0.776** (0.346)
Right Margin					0.077 (0.943)	0.279 (0.755)	0.177 (0.938)
Party Elite					0.996** (0.475)	1.041** (0.411)	1.069*** (0.395)
Soc. Dem. Seat Dis.						-0.163 (0.800)	
Number of Strikes						-0.001 (0.002)	-0.006** (0.002)
Soc. Seat*Num. Strikes						0.007 (0.004)	
Soc. Dem.*Num. Strikes							0.0002** (0.0001)
Constant	1.985 (1.370)	0.565 (1.095)	0.564 (1.187)	0.656 (1.049)	0.248 (0.736)	0.673 (1.062)	0.860 (1.006)
Observations	142	142	142	142	142	142	142
Akaike Inf. Crit.	164.475	158.532	160.532	160.452	161.624	167.597	166.863

Note: Cluster Robust Standard Errors by Party. \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

Table A13: Logit Models on PR Votes w/o Social Democratic MPs

	<i>Dependent variable:</i>								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Vote-Seat Dis. District	-0.569 (1.419)								
Soc. Dem. Vote Share Dis.	-2.936 (3.019)								
Electoral Dispro. Canton		-6.468*** (1.373)		-3.294** (1.515)	-3.336** (1.629)	-3.406** (1.495)	-3.167** (1.562)	-3.238* (1.670)	-3.468* (2.079)
Soc. Dem. Electoral Potential		-0.049*** (0.016)		-0.014 (0.021)	-0.017 (0.027)	-0.017 (0.020)	-0.017 (0.025)	-0.035 (0.030)	-0.022 (0.059)
Elec. Dispro.*Soc. Dem.				-0.381*** (0.115)	-0.366*** (0.122)	-0.365*** (0.111)	-0.396*** (0.077)	-0.370*** (0.109)	-0.641*** (0.170)
Co-Specific Assets				-7.959 (15.370)			-18.270 (16.395)	-14.024 (16.419)	-24.121 (25.886)
Trade					0.277 (1.167)		0.495 (1.149)	0.652 (1.263)	-1.956 (4.331)
Second Round Voting						0.365 (0.526)	0.374 (0.274)	0.442 (0.436)	-0.490 (0.378)
Third Round Voting						-12.413*** (0.888)	-12.364*** (0.813)	-12.271*** (0.815)	-18.289*** (0.821)
Right Margin						-0.012 (0.486)	-0.050 (0.308)	-0.078 (0.344)	-1.287*** (0.185)
Party Elite						0.491 (0.559)	0.589 (0.410)	0.575 (0.432)	1.025** (0.449)
Soc. Dem. Seat Dis.							-1.073 (0.659)		
Number of Strikes							-0.001 (0.002)	-0.002 (0.001)	-0.007 (0.005)
Soc. Seat*Num. Strikes							0.011** (0.005)		
Soc. Dem.*Num. Strikes								0.0002 (0.0001)	0.0002 (0.0003)
Constant	-0.803 (1.150)	-0.077 (1.394)	-0.310 (1.333)	-0.302 (1.343)	-0.362 (1.158)	-0.325 (1.195)	-0.251 (1.155)	-0.203 (1.063)	-15.999*** (3.447)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	No	No	No	No	No	No	No	No	Yes
Observations	504	504	504	504	504	504	504	504	504
Akaike Inf. Crit.	609.435	533.919	517.814	519.370	519.705	523.792	522.357	524.549	457.754

Note: Cluster Robust Standard Errors by Party. \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

Table A14: Pooled Logit Models on PR Votes (Vote Share)

	<i>Dependent variable:</i>							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Vote Share Dispro. Canton	-0.477 (1.103)	0.516 (0.557)	0.519 (0.558)	0.466 (0.577)	0.394 (0.587)	0.460 (0.402)	0.505 (0.383)	0.874 (0.847)
Soc. Dem. Vote Share	-1.117 (3.545)	3.684 (9.047)	3.644 (8.955)	3.188 (9.160)	2.835 (8.752)	0.024 (6.863)	0.075 (7.431)	9.254 (7.061)
Vot. Sh. Dispro.*Soc. Dem.		-4.060 (5.307)	-4.080 (5.366)	-4.060 (5.384)	-3.705 (5.079)	-3.367 (3.588)	-4.685 (4.142)	-5.999* (3.510)
Co-Specific Assets			2.920 (10.581)			-17.906* (9.757)	-14.485 (9.981)	-10.743 (16.129)
Trade			1.958** (0.880)			2.295** (0.894)	2.308** (0.991)	-3.965 (2.716)
Second Round Voting					0.719** (0.334)	0.667** (0.264)	0.712** (0.346)	0.508 (0.502)
Third Round Voting					-13.292*** (0.814)	-13.336*** (0.871)	-13.043*** (0.741)	-17.349*** (1.442)
Right Margin					-0.286 (0.348)	-0.255 (0.229)	-0.361 (0.247)	-0.786 (0.534)
Party Elite					0.686 (0.465)	0.828** (0.338)	0.698* (0.383)	1.139*** (0.336)
Soc. Dem. Seat Dis.						0.132 (0.547)		
Number of Strikes						-0.002 (0.002)	-0.004** (0.002)	-0.007** (0.003)
Soc. Seat*Num. Strikes						0.009*** (0.003)		
Soc. Dem.*Num. Strikes							0.033*** (0.009)	0.020 (0.018)
Constant	-0.237 (1.309)	-1.370 (1.371)	-1.376 (1.386)	-1.720 (1.587)	-1.096 (1.273)	-1.358 (1.442)	-1.185 (1.246)	-3.515*** (1.105)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	No	No	No	No	No	No	No	Yes
Observations	547	547	547	547	547	547	547	547
Akaike Inf. Crit.	709.907	705.026	706.943	699.611	702.912	674.373	680.465	615.880

Note: Cluster Robust Standard Errors by Party. \* p<0.1; \*\* p<0.05; \*\*\* p<0.01

Table A15: Pooled Logit Models on PR Votes (D'Hondt baseline)

	<i>Dependent variable:</i>							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Electoral Dispro. Canton	-4.667*** (1.223)	1.254 (1.961)	1.255 (1.952)	1.271 (1.937)	1.059 (1.726)	1.548 (1.854)	1.377 (1.742)	3.683 (2.818)
Soc. Dem. Electoral Potential	-0.023 (0.025)	-0.010 (0.023)	-0.011 (0.022)	-0.014 (0.025)	-0.011 (0.022)	-0.027 (0.019)	-0.031 (0.032)	-0.020 (0.035)
Elec. Dispro.*Soc. Dem.		-0.400*** (0.148)	-0.399*** (0.148)	-0.388*** (0.149)	-0.387*** (0.143)	-0.362*** (0.117)	-0.377** (0.147)	-0.541*** (0.181)
Co-Specific Assets			2.595 (11.548)			-16.711** (7.827)	-8.899 (8.326)	-30.380 (20.283)
Trade				1.075 (0.920)		1.406 (0.952)	1.394 (0.968)	-2.461 (3.088)
Second Round Voting					0.529 (0.472)	0.394* (0.222)	0.625 (0.447)	0.238 (0.552)
Third Round Voting					-13.424*** (0.846)	-13.648*** (1.015)	-13.213*** (0.758)	-18.020*** (1.172)
Right Margin					-0.061 (0.371)	0.003 (0.228)	-0.151 (0.274)	-1.107* (0.579)
Party Elite					0.604 (0.543)	0.680 (0.458)	0.653 (0.459)	1.120*** (0.385)
Soc. Dem. Seat Dis.						-0.013 (0.961)		
Number of Strikes						-0.001 (0.002)	-0.003* (0.001)	-0.008** (0.004)
Soc. Seat*Num. Strikes						0.009* (0.005)		
Soc. Dem.*Num. Strikes							0.002 (0.0001)	0.0001 (0.0002)
Constant	-0.355 (1.252)	-0.577 (1.169)	-0.581 (1.181)	-0.799 (1.096)	-0.569 (1.081)	-0.714 (1.114)	-0.575 (1.009)	-0.471 (1.200)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	No	No	No	No	No	No	No	Yes
Observations	547	547	547	547	547	547	547	547
Akaike Inf. Crit.	664.047	616.171	618.110	616.136	619.233	608.044	618.609	560.882

Note: Cluster Robust Standard Errors by Party. \* p<0.1; \*\* p<0.05; \*\*\* p<0.01

Table A16: Pooled Logit Models on PR Votes (Disproportionality weighted by Seat Share)

	Dependent variable:							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Electoral Dispro. Canton	-2.032*** (0.654)	0.594 (1.315)	0.572 (1.249)	0.529 (1.327)	0.424 (1.187)	0.498 (1.099)	0.570 (1.176)	1.477 (1.167)
Soc. Dem. Electoral Potential	-0.033 (0.021)	-0.015 (0.023)	-0.016 (0.021)	-0.020 (0.025)	-0.017 (0.022)	-0.033* (0.019)	-0.040 (0.029)	-0.019 (0.035)
Elec. Dispro.*Soc. Dem.		-0.1166** (0.077)	-0.166** (0.076)	-0.157** (0.074)	-0.159** (0.073)	-0.145*** (0.053)	-0.156** (0.070)	-0.196*** (0.053)
Co-Specific Assets			4.498 (11.520)			-15.838 (9.765)	-7.908 (10.203)	-17.586 (13.151)
Trade				1.605* (0.886)		1.798* (0.935)	1.873** (0.954)	-2.191 (2.806)
Second Round Voting					0.559 (0.379)	0.418* (0.220)	0.612 (0.380)	0.035 (0.579)
Third Round Voting					-12.907*** (0.754)	-13.012*** (0.771)	-12.668*** (0.734)	-17.267*** (1.048)
Right Margin					-0.279 (0.380)	-0.206 (0.235)	-0.341 (0.283)	-1.216** (0.558)
Party Elite					0.577 (0.480)	0.651 (0.396)	0.611 (0.411)	1.027*** (0.379)
Soc. Dem. Seat Dis.						-0.196 (0.789)		
Number of Strikes						-0.001 (0.002)	-0.003* (0.001)	-0.008** (0.003)
Soc. Seat*Num. Strikes						0.009* (0.005)		
Soc. Dem.*Num. Strikes							0.0002 (0.0001)	0.0001 (0.0002)
Constant	-0.400 (1.265)	-0.626 (1.216)	-0.631 (1.226)	-0.950 (1.177)	-0.488 (1.142)	-0.679 (1.161)	-0.588 (1.095)	-5.287*** (0.603)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	No	No	No	No	No	No	No	Yes
Observations	547	547	547	547	547	547	547	547
Akaike Inf. Crit.	646.826	605.899	607.713	603.377	607.952	597.586	603.846	544.089

Note: Cluster Robust Standard Errors by Party. \*p<0.1; \*\*p<0.05; \*\*\*p<0.01



## 4 Gruner's Electoral Potential Data

In this section, we provide, based on Gruner (1978a, 1978b), a detailed explanation of how the electoral potential is calculated. The electoral potential estimates the expected vote share a party would have received under proportional representation (PR). The electoral potential needs to be calculated because district-level vote shares received under majoritarian rules (MR) in multi-member districts, as used in Switzerland before 1918, are inadequate predictors of how a party would fare under PR.

Gruner's electoral potential data compensates for three problems of district-level vote shares. First, given that cantonal borders constituted legal barriers to redistricting under MR and cantons were the expected districts under any PR system (see section 2.1 above), the parties' electoral potential at canton level – and not their vote share at the district level – is a more valid indicator of the Social Democrats' electoral strength and thus the MPs' position vis-à-vis PR. Second, multi-member districts under MR incentivize the creation of district-level electoral alliances between parties. A party's district-level vote share can therefore misrepresent its actual electoral strength, because voter preferences are not necessarily expressed by party but by district-level electoral alliances.<sup>30</sup> Third, district-level vote shares might underestimate some of the parties' electoral strength (in particular in case of smaller or emerging parties), because voters might refrain from using all of their votes (e.g. voters choosing only three candidates although there are five seats in the district, thus leaving two lines "empty"). Admittedly, the electoral potential data cannot correct for all elements of strategic voting (Cox, 1997). Therefore, strategic voting remains a concern with Gruner's electoral potential data (as in all electoral studies). Yet, his data proves to be an excellent predictor of election outcomes under PR, as we show below.

The data can be found in Gruner (1978b, pp. 373–397), while Gruner (1978a, pp. 58–73) provides a detailed explanation of how the parties' electoral potential at the can-

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<sup>30</sup>District-level electoral alliances are defined as the endorsement of a candidate (or set of candidates) by more than one party (cf. Schröder & Manow, 2018). In contrast to electoral cartels (cf. Cox, 1997), seats are still allocated to candidates directly.

tonal level has been calculated. As Gruner's work is available only in German, we summarize his approach in the following. Gruner and his team had the following data at their disposal to estimate the parties' electoral potential at the cantonal level.

1. All candidates, their party affiliations, and the vote share per candidate.
2. A complete list of other parties that supported these candidates as part of district-level electoral alliances (although these candidates were not affiliated with these parties). Importantly, such electoral alliances were often created to support specific candidates. They did not necessarily cover all of a party's candidates.
3. The number of voters, the number of seats in a district, and the number of votes cast, which allowed them to calculate the number of votes that went unused ("empty lines").
4. An *extensive* documentation of the candidate selection processes and the political debates preceding the election for each district.

In addition, Gruner and his team took advantage of the fact that the districts under PR are identical with Swiss cantons, while electoral districts under MR were not allowed to cut across cantonal borders (as stipulated by the Swiss constitution in art. 73 of the 1874 constitution). Each electoral district under PR therefore corresponds exactly to one or more electoral districts under MR. Hence, no adjustments for electoral districts under MR cutting across electoral districts under PR are necessary.

To estimate the parties' electoral potential, Gruner needed to answer two questions. First, in presence of a district-level electoral alliance between at least two parties, which party would the voters have supported if they had to vote for a party rather than the alliance? For instance, if parties A and B form an electoral alliance with one candidate each and both candidates obtain about 5'000 votes, which share of these 5'000 voters are supporters of party A and which share would have supported party

B? Second, what party would those voters support, which did not use all of their votes? For instance, in a district with five seats, each voter has five votes to give. Yet voters often refrained from using all of their votes, because they did not find a sufficient number of candidates appealing. Hence, an estimate of electoral potential must consider these "empty lines," because these votes would not have been lost if voters had casted their vote for parties.

Gruner and his team developed a series of strategies to answer these two questions, which we briefly discuss below. Needless to say, these strategies are not perfect and the data must be considered an approximation of the real electoral potential. In addition, this research, conducted in the early 1970s, does not live up to today's standards in terms of transparency and replicability.<sup>31</sup> Nevertheless, Gruner's work is an impressive and path-breaking contribution. In more than 2'000 pages, Gruner provided a detailed documentation of every single national election from 1848 (creation of the federal state) to 1917 (last election under MR) – including a description of all major political issues, the candidate selection, and the election campaigns.

In addition, although clearly imperfect, Gruner's data on electoral potential turn out to be excellent predictors of party vote shares under PR. More concretely, we would expect Gruner's estimates of electoral potential based on the 1917 election (the last one under MR) to be a good predictor of vote shares in the 1919 election (the first one under PR). This is indeed the case. In the case of the Social Democratic Party, the bivariate correlation amounts to 0.87.<sup>32</sup> In addition, we would expect the 1917 electoral potential (as calculated by Gruner) to be a better predictor of 1919 vote shares (under PR) than the 1917 vote shares (under MR). [Table A17](#) shows that this is clearly the case. Model 1 shows a strong and highly significant effect of the 1917

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<sup>31</sup>However, the data and documents used by Gruner and his team are accessible in the Swiss Federal Archive (<https://www.swiss-archives.ch/detail.aspx?ID=3790354>), which reflects the unique status of Gruner's work in Switzerland's political science community.

<sup>32</sup>We look at the Social Democratic Party, because this party did not change its organizational structure between 1917 and 1919. In contrast, the Radical Party and its allies reorganized following the introduction of PR. Among others, the Radical Party's farmers' wing created its own party, which ultimately resulted in today's Swiss People's Party. Hence, for the Radical Party, a comparison between 1917 and 1919 is not meaningful.

electoral potential on 1919 votes shares. When the 1917 vote share (aggregated to the cantonal level) is added (Model 2), the coefficient of the electoral potential variable remains highly significant, while the 1917 vote share does not have a significant effect on the 1919 vote share.<sup>33</sup> In addition, the explanatory power does not improve as a result of the inclusion of the 1917 vote share (see last row of Table A17). Given the eventful period between 1917 and 1919, including the end of the First World War, an economic crisis, and the country's first general strike (in 1918), the ability of the 1917 electoral potential to predict 1919 vote shares is impressive.

Table A17: Effect of 1917 electoral potential on 1919 vote share (at cantonal level)

	Vote Share 1919	
	(1)	(2)
Electoral potential 1917	0.682*** (0.080)	0.536*** (0.162)
Vote share 1917 (cantonal level)		0.164 (0.157)
Constant	4.119* (2.199)	4.483* (2.223)
Observations	25	25
Adjusted R <sup>2</sup>	0.747	0.748
<i>Note:</i>	*p<0.1; **p<0.05; ***p<0.01	

How exactly did Gruner and his team proceed? Gruner calculated the electoral potential taking each district's specific situation into account. Hence, there is no statistical model to report but rather a series of calculation strategies that were used dependent on the concrete situation in a given electoral district. When different candidates of the same party received more or less the same number of votes, no electoral alliances were used, and there were few "empty lines," Gruner assumed that electoral potential and vote share did not differ, because voters seemed to have voted exclusively along partisan lines. Yet, electoral potential and vote share were assumed to differ when different candidates of the same party received different numbers of votes (typically the case when electoral alliances were used, because electoral alliances did not neces-

<sup>33</sup>However, coefficient and t-value of the electoral potential variable become smaller because the 1917 electoral potential and the 1917 vote share are - of course - positively correlated.

sarily include all of a party's candidates), when the number of possible votes and the number of actual votes differed substantially (indicating a large number of "empty lines"), when fewer candidates per party run for office than seats were available, and when voters were expected to also cast votes for candidates of other parties.

To deal with such situations, Gruner used a series of strategies to gauge the electoral potential. Most importantly, he compared candidates of the same party with and without electoral alliances to distinguish between party voters and supporters from other parties. Yet, when electoral alliances were contentious, i.e. when there were visible disagreements within the party regarding the decision to support a candidate of another party, he assumed that electoral alliances would generate a lower number of supporters from other parties. In addition, he took into account whether parties suggested fewer candidates than there were seats in a district. Parties fielding fewer candidates than seats were likely to receive fewer votes than their electoral potential would have suggested. Finally, in cases where these strategies did not work, Gruner compared the results of previous and later elections to get an estimate of the party's electoral potential.

An example might be able to illustrate how these strategies work (based on Gruner, 1978a, pp. 66–67). The example nicely demonstrates the complexity but also the ingenuity of Gruner's approach. In a district with four seats, five parties (A to E) field in total eight candidates (1 to 8). 12'000 voters participated in the election, which gives a possible total of 48'000 votes (four votes per voter). Yet, not all voters used all of their votes. There are 3'000 "empty lines," indicating that a number of voters voted for only three or fewer candidates (thus leaving lines on their ballot papers "empty"). [Table A18](#) shows the party affiliations of the eight candidates (cells marked grey), the parties supporting these candidates as part of an electoral alliance (indicated as "support"), and the number of votes that these candidates have received (second column in table). Five candidates were part of electoral alliances (albeit different ones), while three candidates were not supported by other parties. All of this information was

Table A18: Calculation of electoral potential: Party affiliations, electoral alliances, and votes by candidates

	Votes	Party A	Party B	Party C	Party D	Party E
Candidate 1	10'500	Support	Support	Support	Support	Affiliation
Candidate 2	9'000	Support	Support		Support	Affiliation
Candidate 3	8'000	Affiliation				Support
Candidate 4	8'000	Affiliation				Support
Candidate 5	3'000		Support	Affiliation		
Candidate 6	3'000	Affiliation				
Candidate 7	2'000		Affiliation			
Candidate 8	1'500				Affiliation	
Total votes given:	45'000					
Empty lines:	3'000					
Total possible votes:	48'000					

available to Gruner.

As [Table A18](#) shows, parties A and E win the election by getting two seats each (with candidates 1 to 4), while candidate 1 received the most votes with 10'500. Yet what is the five parties' electoral potential? In a first step, Gruner needs to deal with the problem of electoral alliances, which make it difficult to distinguish between party voters and supporters from other parties. Gruner assumes that candidates receive votes (and voters vote for candidates) only if the candidates are affiliated with the voter's party or if the voter's party supports the candidate as part of an electoral alliance. In addition, it is important to note that voters cannot vote multiple times for the same candidate.

Gruner's approach is to fill the empty cells akin to a crossword puzzle. Given that candidates 6, 7, and 8 are not part of electoral alliances and their parties have not fielded more candidates than seats, Gruner concludes that all of the votes these candidates have received must come from supporters of these parties. For instance, candidate 6 is supported only by Party B. Hence, all of his 2'000 votes must come from party B voters. There are thus 2'000 party B voters. In a similar vein, Gruner concludes that there are 3'000 party A voters and 1'500 party D voters.

Candidates 3, 4, and 5 are supported by electoral alliances consisting of two parties. In each case, we already have information about one of the two parties' number of

voters. Based on this information, Gruner concludes that party C must have 1'000 voters, because candidate 5 with a total of 3'000 votes already receives 2'000 votes from party B. In a similar vein, he concludes that party E must have 5'000 voters, because candidates 3 and 4 with a total of 8'000 votes already each receive 3'000 votes from party A.

Candidates 1 and 2 provide the biggest challenge because they are part of electoral alliances consisting of four and five parties respectively. A first step to resolve this puzzle is to note that party A supports five candidates although there are only four seats. For the sake of the example, Gruner cites qualitative evidence from the party's delegate assembly that there was no agreement whether to support candidate 1 or candidate 2 from party E – next to party A's own three candidates (no. 3, 4, and 6). Gruner (1978a, p. 67) thus assumes that the votes of the 3'000 party A voters were evenly split between candidate 1 and candidate 2 (each receiving 1'500 votes). Another plausible assumption would be that the two candidates of party E receive full support by party E voters. Yet, again for the sake of the example, Gruner cites qualitative evidence that candidate 2 is not popular among all party E voters. Hence, in this example, Gruner assumes that the well-liked candidate 1 receives all 5'000 votes from party E voters, while the less popular candidate 2 receives only 4'000 votes.

The remaining cells can now be filled. The 2'000 party B voters and the 1'500 party D voters together with the 1'500 party A voters and the 4'000 party E voters amount to the 9'000 votes candidate 2 has received. Subtracting the 1'500 party A voters and the 5'000 party E voters from the 10'500 votes received by candidate 1 shows that not all voters of parties B, C, and D have supported candidate 1. Again citing qualitative evidence that candidate 1 was particularly controversial among party B voters, Gruner concludes that not all 2'000 party B voters decided to vote for candidate 1 (1'500 rather than 2'000 voters).

[Table A19](#) shows how Gruner's approach allows for the allocation of votes received

Table A19: Calculation of electoral potential: Votes by party

	Votes	Party A	Party B	Party C	Party D	Party E
Candidate 1	10'500	1'500	1'500	1'000	1'500	5'000
Candidate 2	9'000	1'500	2'000		1'500	4'000
Candidate 3	8'000	3'000				5'000
Candidate 4	8'000	3'000				5'000
Candidate 5	3'000		2'000	1'000		
Candidate 6	3'000	3'000				
Candidate 7	2'000		2'000			
Candidate 8	1'500				1'500	
Total votes given:	45'000	12'000	7'500	2'000	4'500	19'000

by candidates to parties. The last row displays the sum of all votes per party. Party E received the most votes with 19'000, while party A comes second with 12'000 votes.

Gruner now turns to the second problem, the "empty lines." As mentioned above, 3'000 votes were cast empty (of a total of 48'000 votes). Which parties would have received these votes? Gruner's approach is to look at discrepancies between the number of seats and the number of candidates supported by a party. In the example, although there are four seats, party C supports only two candidates, while party D supports three candidates. Gruner assumes that most party C and party D voters followed their parties' vote recommendations and voted for only two (party C voters) or three candidates (party D voters) respectively. Hence, he allocates two thirds of the "empty votes" to party C (because its voters left two lines empty), which thus receives another 2'000 votes, and one third to party D. Hence, party C's total vote is raised to 4'000, while party D's total is raised to 5'500 (see [Table A20](#)). Hence, according to Gruner's approach, for each party with a number of candidates below district magnitude, the total votes (incl. "empty lines") are calculated as if the party had supported as many candidates as there are seats.

Finally, based on these numbers, Gruner now calculates the parties' electoral potential (third column in [Table A21](#)). Compared to the total number of possible votes (48'000), party A's vote share of 12'000 amounts to 25 percent, while party's B vote share of 7'500 amounts to 15.6 percent. With 39.6 percent, party E has the largest electoral potential.



Table A20: Calculation of electoral potential: Correcting for "empty lines"

	Total Votes (excl. "empty lines")	Additional Votes (due to "empty lines")	Total Votes (incl. "empty lines")
Party A	12'000	0	12'000
Party B	7'500	0	7'500
Party C	2'000	2'000	4'000
Party D	4'500	1'000	5'500
Party E	19'000	0	19'000
<b>Total</b>	<b>45'000</b>	<b>3'000</b>	<b>48'000</b>

Table A21: Calculation of electoral potential: Total votes and electoral potential

	Electoral potential as calculated by Gruner		Vote share (uncorrected)	
	Total votes (incl. "empty lines")	Electoral potential in %	Total votes for party's candidates	Vote share in %
Party A	12'000	25.0	19'000	42.2
Party B	7'500	15.6	2'000	4.4
Party C	4'000	8.3	3'000	6.7
Party D	5'500	11.5	1'500	3.3
Party E	19'000	39.6	19'500	43.3
<b>Total</b>	<b>45'000</b>	<b>3'000</b>	<b>48'000</b>	

Importantly, these numbers differ starkly from the parties' vote share (last two columns in [Table A21](#)). A party's vote share is calculated by dividing the sum of its candidates' vote share by the number of votes cast (45'000). In the case of party E with its candidates 1 and 2 (which received 10'500 and 9'000 votes respectively), the vote share amounts to  $19'500/45'000 = 43.3$  percent (i.e. vote shares of party E's two candidates divided by votes cast). This is just slightly more than what party A has received (42.2 percent). Yet party A's numbers are misleading, because party A's vote share is inflated due to its electoral alliance with party E (i.e. a large share of voters supporting party A's candidates 3 and 4 are in fact party E voters). At the same time, the vote shares of parties B, C, and D underestimate these parties' electoral potential because they do not take into account that they are less often part of electoral alliances and that they have supported fewer candidates than there are seats. For instance, candidate 8, affiliated with party D, received only 1'500 votes. Yet party D voters have also supported candidates 1 and 2 (as part of electoral alliances). In addition, a large number are likely to have left an "empty line" on their ballot papers. Hence, party D's true electoral potential is not a meagre 3.3 percent ( $1'500/45'000$ ), as suggested by the votes share of its candidate, but in fact an impressive 11.5 percent ( $5'500/48'000$ ).

As this example illustrates, Gruner's approach strongly relies on contextual knowledge. In addition, at multiple times, expert judgements play a central role. Yet, as the detailed documentation of every election in the period 1848 to 1917 demonstrates, there might be nobody in a better position to make these decisions than Gruner himself. In addition, the resulting indicator proves to be a powerful predictor of vote shares under PR rules (see [Table A17](#) above). Hence, although these estimates are unlikely to be perfect, they are highly likely better predictors of parties' electoral potential than their vote shares.

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